STEEL The Metalworking Weekly

A GUIDE TO

TOOL STEELS & CARBIDES

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MAY 15, 1961

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Check and Double Check — BETTER GEARS

This Helical Lead Measuring Instrument* checks and records within .0001" the helix angle on helical gears to assure that the position of the tooth bearing meets the print specifications.

This machine utilizes the optical principle of machine setting (A) to measure accurately any angular deviations observed visually (B) and permanently recorded (C).

This is one of many details of gear manufacture and inspection that has won for DOUBLE DIAMOND gears their reputation as gears thoroughly qualified for top performance in any application for which you buy them.

Our sales representatives are engineers and gear designers — ready to tackle a gear assignment at any stage of its development. When may one call on you?

Just write or phone.

**This model was introduced at the 1960 Machine Tool Exposition in Chicago.*

EATON

AUTOMOTIVE GEAR DIVISION
MANUFACTURING COMPANY
RICHMOND, INDIANA

GEARS FOR AUTOMOTIVE, FARM EQUIPMENT AND GENERAL INDUSTRIAL APPLICATIONS
GEAR-MAKERS TO LEADING MANUFACTURERS

Behind your knowledgeable Steel Service Center stands the American steel industry's army of experts on selecting and fabricating steel sheets, plates, structurals, bars, alloy steels, and tool steels. What technical information do you need? Ask your Steel Service Center. Ask—you'll get a fast, intelligent answer.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

Steel

for Strength
. . . Economy
. . . Versatility

BETHLEHEM STEEL

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NOW...

Consider the most versatile zinc-coated steel yet produced

...NEW ARMCO

It's durable, paintable, weldable

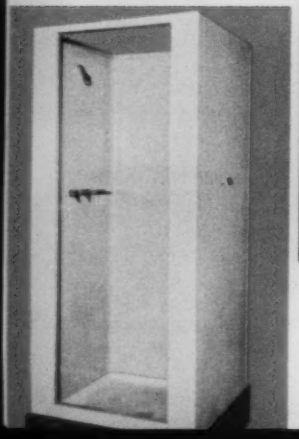
Spangle-free Armco ZINCGRIP® A, PAINTGRIP® is a new zinc-coated steel prepared at the mill to take a smooth, lasting paint finish right after fabrication.

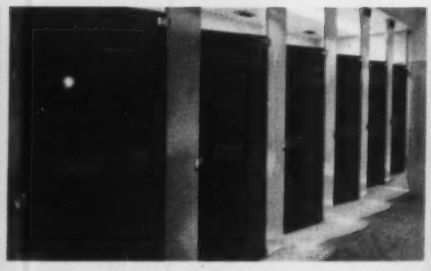
Three years of outdoor tests demonstrate paint adherence and paint life that's superior to phosphate-treated cold-rolled steel and all other zinc-coated steels prepared for painting. In addition, when paint is damaged or where there's no paint at all, the zinc coating on ZINCGRIP A, PAINTGRIP locks out rust.

Twice as many spot welds can be made as on ordinary galvanized steel before electrode tips need redressing. And this new grade is just as workable as ductile Armco ZINCGRIP—the zinc-coated steel that has proved itself in severely drawn and formed products for a quarter-century.

New Armco ZINCGRIP A, PAINTGRIP is available *now* with 1.25 oz. per sq. ft. class coating or light commercial coating; in 16 to 24 gage cut lengths and coils up to 48 inches wide, depending on gage. Write for more details. Armco Division, Armco Steel Corporation, 1981 Curtis Street, Middletown, Ohio.

ARMCO Armco Division

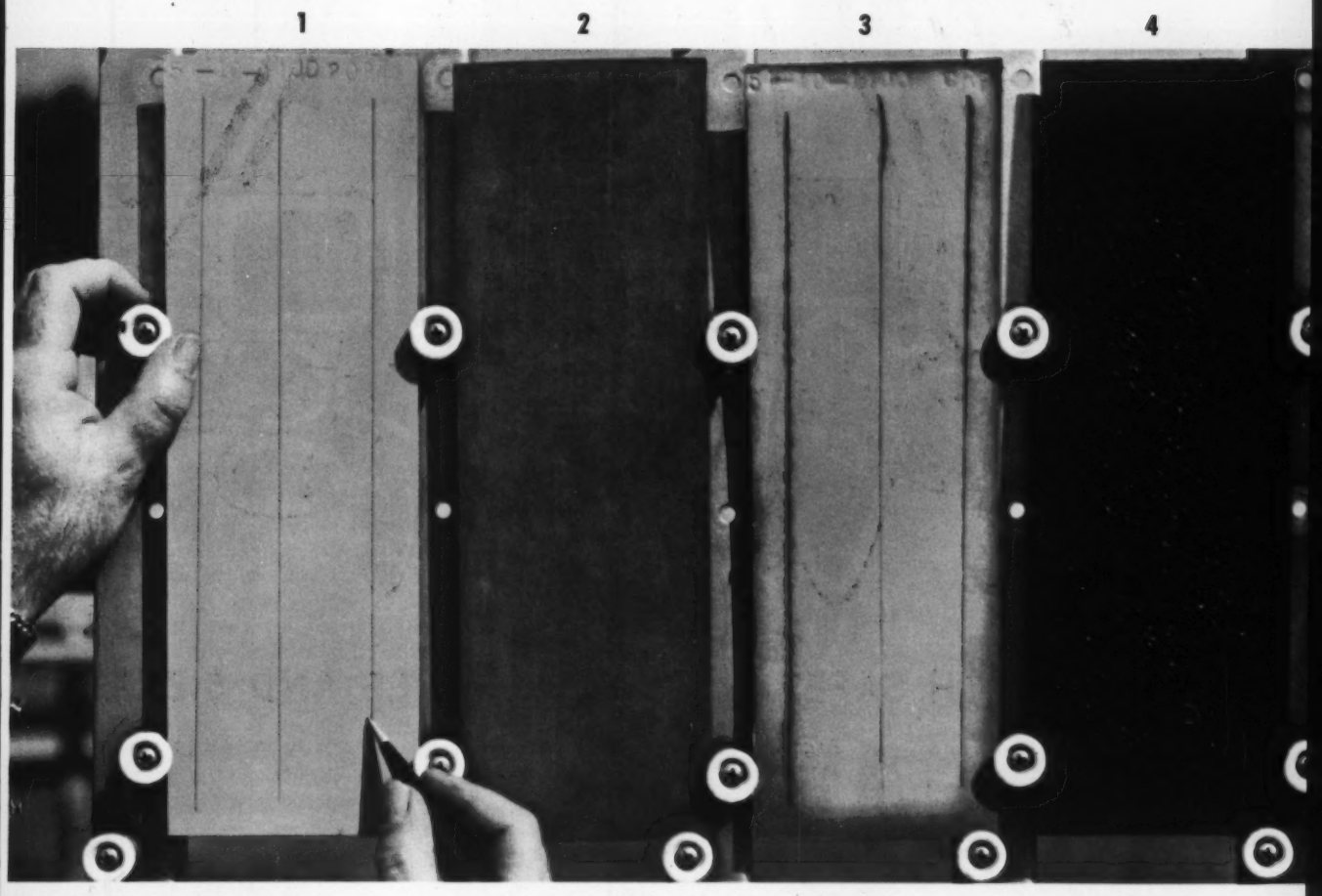




Rust-resistance and spangle-free paintable surface mean lasting good looks in applications such as these.

New steels are born at Armco

ZINCGRIP A, PAINTGRIP

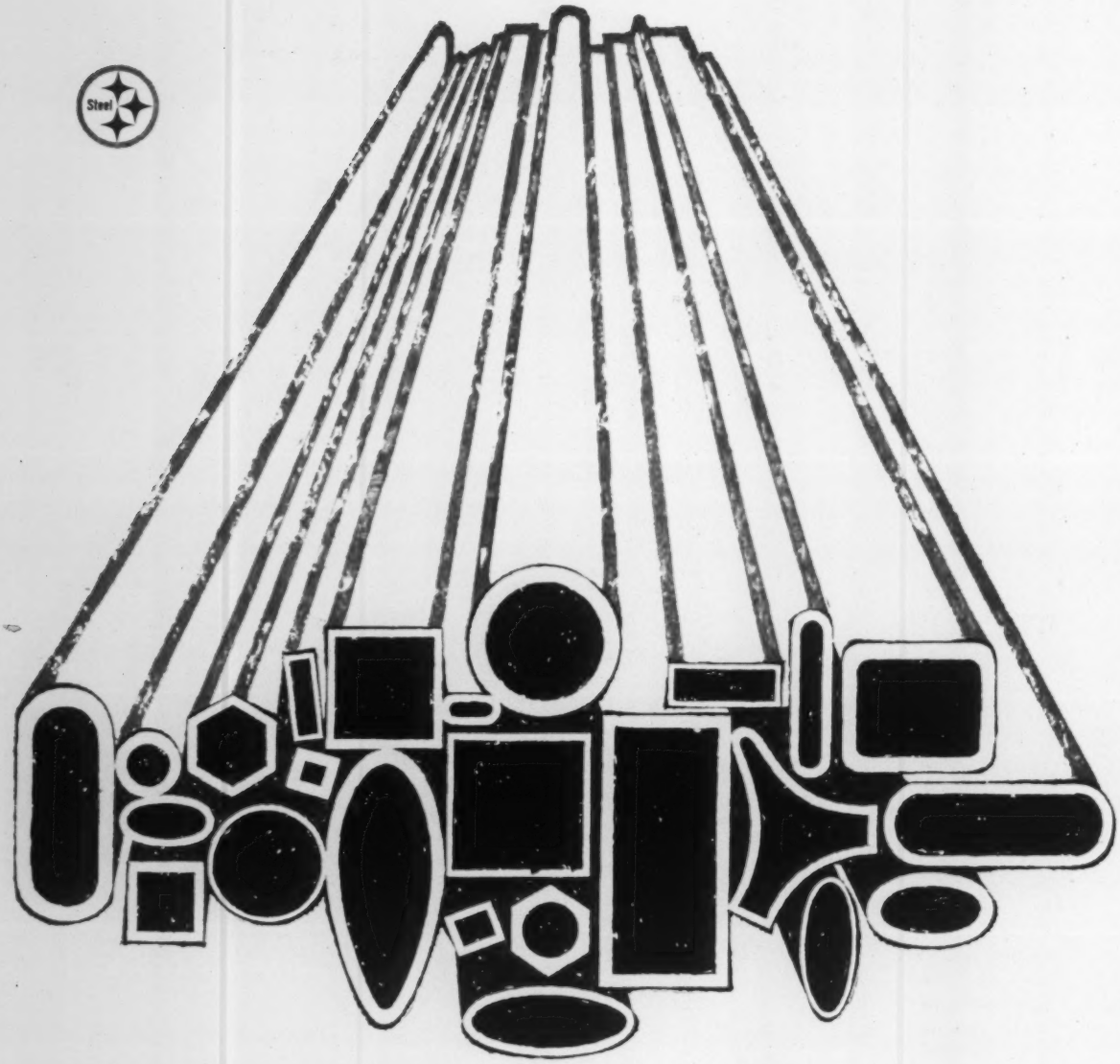


This half-painted bus body fabricated from Armco ZINCGRIP A, PAINTGRIP has been exposed for 2½ years. Paint finish is still smooth and attractive, the unpainted surface rust-free.

After 3-years' exposure outdoors, paint holds tightly to sample of Armco ZINCGRIP A, PAINTGRIP (1), even where scratched at start of test. Where unpainted (2) there's no rust either. In contrast, painted and unpainted phosphate-treated cold-rolled steel panels (3 and 4) are in poor condition. Paint has been undercut. Rust is entrenched.

Galvanized Steel

Use this label to point out durable zinc-coated steels in your products



DESIGN WITH SAFETY...IN ALL SHAPES AND SIZES!

Armco Steel Corp. ♯
The Babcock & Wilcox Co., Tubular Products Div. ♯ ♭
The Carpenter Steel Co., Alloy Tube Div. ♭
Jones & Laughlin Steel Corp., Electricweld Tube Div. ♯
National Tube Div., United States Steel Corp. ♯
Ohio Seamless Tube Div., Copperweld Steel Co. ♯
Republic Steel Corp., Steel and Tubes Div. ♯ ♭
Revere Copper & Brass Inc., Rome Mfg. Co. Div. ♯ ♭
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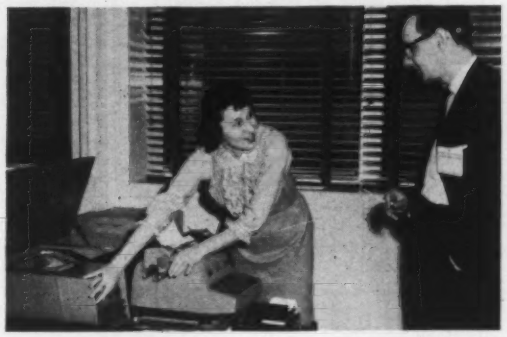
♭ PRODUCES WELDED STAINLESS STEEL TUBE
♯ PRODUCES WELDED CARBON STEEL TUBE

Regardless of the shape or size, when you specify domestically-produced welded steel tubing, you are assuring uniformity. Wall thicknesses are uniform, concentricity exact. In a rotating part, the result is a better, safer, vibration-free operation. In other applications, the welded steel tube gives you the same design strength as bar stock, with less weight.

The quality producers at left are prepared to help you design with tubing in all weldable grades of carbon, stainless steel and other alloys. You can get useful information from any of them or you can write for your free Booklet 8591, Dept. **ST-3,** Welded Steel Tube Institute, Inc., Hanna Building, Cleveland 15, Ohio. It will pay in uniformity, safety, and savings in weight.

WELDED STEEL TUBE INSTITUTE, INC.

Automation and the Editor



Will automation replace editors? That's the question puzzling Detroit Editor Don Postma (and us).

The writing machine you see above is in the custody of Joanne Conner, a secretary at General Motors Corp.'s Fisher Body Div. She has the job of typing personalized answers to about 5000 queries sent in annually by members of Fisher Body's Craftsman's Guild. About 500,000 young men, age 11 to 20, are enrolled in the guild. Each year, they design and build model cars to compete for more than $100,000 worth of cash and university scholarships.

Their questions range from queries on vocational guidance to what body structure can best accommodate front wheel drive. Over the years, Fisher has found that 175 basic paragraphs will answer most of the questions.

The problem: How to do the job quickly and still give each letter the personal touch it deserves? Answer: Buy an automatic typewriter and punch out answering paragraphs on a paper roll—it in turn, operates the machine on the principle of the player piano.

All Joanne does is type the salutation and press the proper "answer" buttons. The typewriter does the rest, reading (and typing) the "personalized" paragraphs at a rate of 150 words a minute—three times faster than Joanne can do by hand.

We've been analyzing the last 50 editions of Servicenter, and 80 key paragraphs keep cropping up. We'll get in touch with Fisher Body, and when the vacation season is here next month . . .

Enzymes Aid Writer's Cramp

Wallerstein Co., big in the enzyme field, has scored again. It now offers new biochemical catalysts to help authors who seek to improve the scientific diets of their colleagues and successors. These are now available:

- Techno-amylase—an enzyme complex that removes starchy components in articles.
- Techno-protease—an enzyme system that removes proteinaceous quagmire to allow readers to get to the heart of the subject.
- Techno-pectinase—a system that clarifies articles by reducing their viscosity.
- Techno-flavor—a new one that adds flavor to stories, ensuring sustained reader interest and consumption.

Reader Reaction

It's hot and heavy for our impact report on Price Fighting, which appeared Apr. 17. A sample, from an officer at Central National Bank of Cleveland:

"The whole issue is one of the most exhaustive studies of a problem that I have ever seen. It illustrates the type of solid information a magazine like STEEL can furnish its readers."

Bound reprints of the impact report on Price Fighting are available at $2 a single copy; prices for larger quantities on request. Write Reprint Department, STEEL, Penton Bldg., Cleveland 13, Ohio.

Sight and Scent

Unless they invent a toothpaste for men who can't brush between deep space missions, our astronauts may return to earth wearing green grins, reports Don Bailer of Aerojet-General Corp.

Besides not being able to brush their teeth on long voyages, the spacemen will have to wait months or years to shave or bathe. Aerojet-General researchers say that dentifrices cause a "foaming" problem for water recycling systems in spaceships. Shaving soaps would harm a spaceship's bacterial digestion system. Whisker fragments from an electric razor would create a big dust problem. Weight and water demands would be too great for bath facilities.

So the rugged, well bathed, and barbered adventurers who start out as members of the carefully selected, favored few will come back as the rather unfavorable phew.

STEEL, the metalworking weekly, is selectively distributed without charge to qualified management personnel with administrative, production, engineering, or purchasing functions in U. S. metalworking plants employing 20 or more. Those unable to qualify, or those wishing home delivered copies, may purchase copies at these rates: U. S. and possessions and Canada, $10 a year; all other countries, $30 a year; single copies, 50 cents. Metalworking Yearbook issue, $2. Published every Monday by The Penton Publishing Co., Penton Bldg., Cleveland 13, Ohio. Accepted as controlled circulation publication at Cleveland, Ohio.

TO FIND THE MAN YOU NEED...

Place an advertisement in the "Help Wanted" columns of STEEL's classified pages. Your advertisement will reach the qualified men you need, because STEEL is addressed to highly-trained men in all phases of metalworking.

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The Metalworking Weekly

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ALEMITE OIL-MIST WITH THERMO-AIRE® CUTS HOT STRIP MILL LUBRICATION COST 90% ON WORK ROLL BEARINGS!

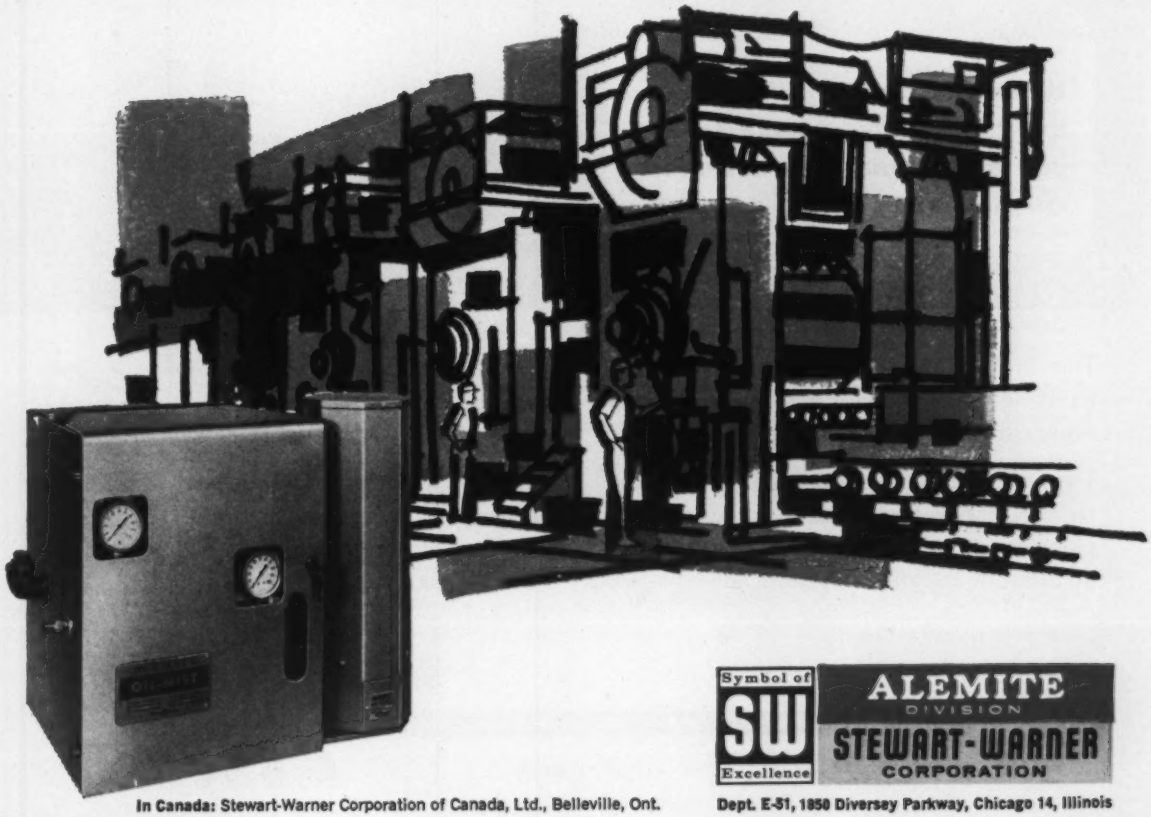
There is no comparison between Alemite Oil-Mist with Thermo-Aire and old-fashioned grease methods!

Take economy. Lubrication savings amount to $32.00 on every turn with Alemite Oil-Mist with Thermo-Aire. Oil-Mist was installed on one stand . . . and is being installed on nine other stands to replace an out-dated system for lubricating 40 roller bearings on an 80-inch hot strip mill. Working 15 turns a week, 52 weeks, these savings will add up to nearly $25,000 a year!

Take efficiency. Alemite Oil-Mist with Thermo-Aire is a fully automatic lubrication system. It applies lubricants constantly, properly, *without losing a minute of valuable production time.* It eliminates expensive packing of bearings with grease and also completely eliminates need to clean bearings of old grease. Its exclusive "Thermo-Aire" feature preheats incoming air—permits atomization of even the heaviest straight mineral oils to supply heavy-duty bearings with the high viscosity lubricants they need for smooth, steady performance.

Alemite Oil-Mist with Thermo-Aire will improve mill operating efficiency...lengthen bearing life . . . cut oil consumption and prevent product spoilage.

Write for illustrated brochure form 37-32, or see your Alemite representative for the amazing story of Alemite Oil-Mist with Thermo-Aire and how you can benefit from it!



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Dept. E-51, 1850 Diversey Parkway, Chicago 14, Illinois

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whenever you... think equipment

When you buy handling equipment for today... make sure it can be expanded to a system tomorrow!

This is the advice of a leading materials handling publication . . . and this is the way American Monorail engineers advise you.

The American Monorail cranes shown above can be installed a bay at a time — as your plant grows. You can interlock them to give an efficient integrated system.

This type of "look ahead" planning is what you get from our engineers when you decide on a traveling Monorail track system, too.

Just tell us what you need today and tell us about your dreams of the future. In that way we can help you plan the big picture at lower cost. Write for Bulletin C-2.

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TIPS FROM A ROLL MAKER'S NOTEBOOK

MACKINTOSH-HEMPHILL DIVISION, E. W. BLISS COMPANY, Pittsburgh 3, Pennsylvania

Cast mill rolls • Cinder pots • rotary tube straighteners • end-thrust bearings • heavy-duty lathes • steel and special alloy castings

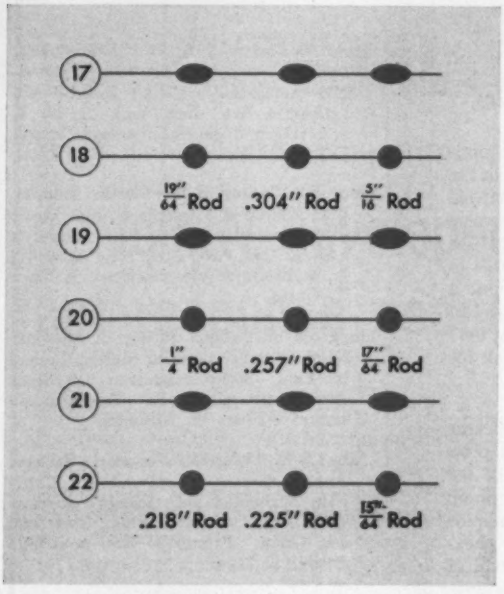
EASY WAY TO

Improve rod mill roll life...and product quality

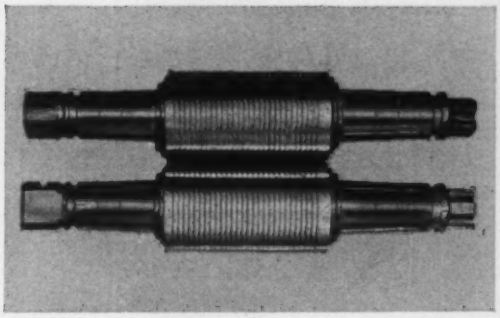
Sometimes, the tried-and-true way of doing something gets so thoroughly established that people tend to forget that there may be a better way. A good case in point is the rolls that are used in rod mill finishing stands. For various reasons, most of these mills use rolls of 70 Shore hardness or below. The passes are many and fine, and at this hardness they are relatively easy to cut.

However, several of our rod mill roll customers have been trying rolls a good 4 to 6 Shore points harder than the widely accepted top limit.

Results, in our opinion . . . and our customers'. . . have more than justified the somewhat greater degree of difficulty in turning and redressing the rolls. In fact, total turning and redressing time has been cut, since the passes wear so much more slowly. In at least one instance, the use of these harder rolls has eliminated *all* early roll changes in the finishing stands.



Flow sheet for fine rod sizes. It is the last five stands where the performance of the harder rolls makes the greater difference.



Set of #3 Nichillite rod mill finishing rolls, 74 Shore. These particular rolls have given outstanding results in the finishers of a modern high-speed Midwestern mill.

Stoning time cut sharply. In this particular mill, the harder rolls have cut stoning time in half. Even more important, however, is the increased yield of top-quality material. As a result, there has been a general upgrading of the product at all levels, with a consequent improvement in profits directly traceable to the harder rolls.

Two good roll analyses. If you operate a rod mill, we suggest that the next time you order rolls for the finishing stands, you specify some sets of Mack-Hemp *Nichillite* chilled nickel alloy iron rolls in the 74-to-76 Shore hardness range. These should give you performance similar to that described above, together with the best possible surface finish on the rolled rod.

Eventually you will want to raise the hardness of the intermediate stand rolls to complement the better service of the finishing stands. This will achieve a total upgrading of roll service throughout the mill and result in an even better finished product.

On the other hand, if your mill is one of the new high-speed types, we recommend our *Nironite C* nickel-chromium-iron analysis, in the same hardness range. *Nironite C* rolls provide an extra margin of strength to take the heavy torsional stresses developed by faster mills.

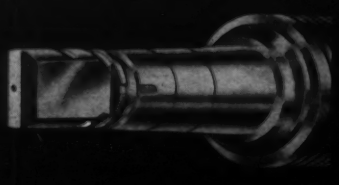
No matter what your problem of roll use or selection, you'll find that Mack-Hemp can give you helpful advice on the best way to solve it. Simply write or telephone us. Address Mackintosh-Hemphill Division, E. W. Bliss Company, 901 Bingham Street, Pittsburgh 3, Pa.

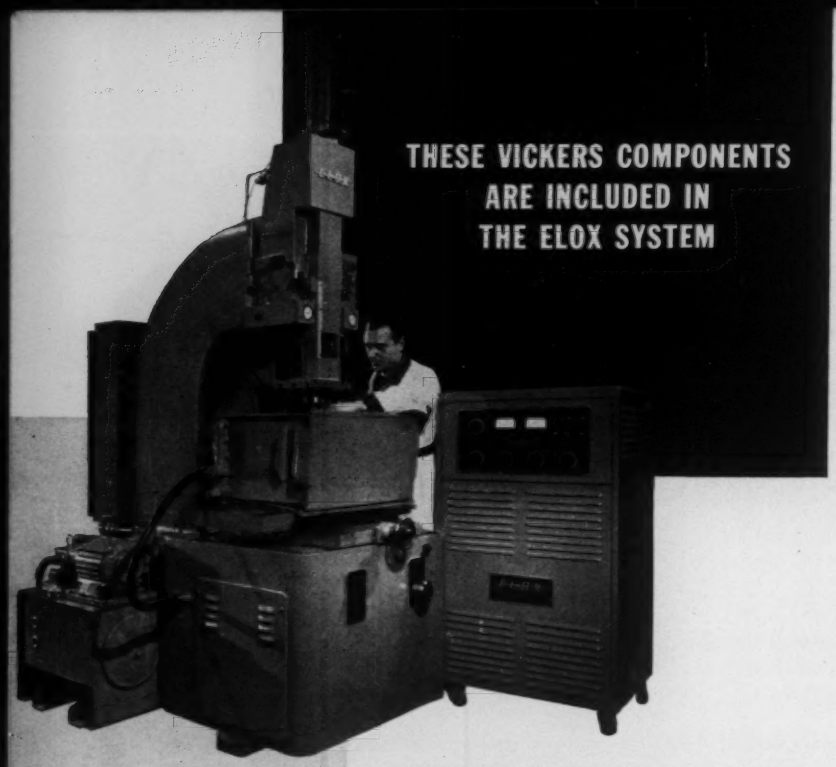
MACKINTOSH-HEMPHILL

You get more tonnage from "the rolls with the Striped Red Wabblers"

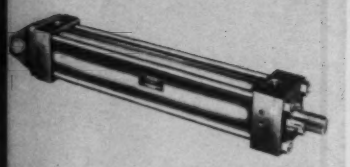
Division of E. W. BLISS COMPANY

Presses, Rolling Mills, Special Machinery

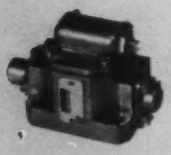




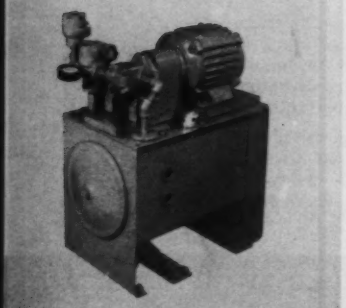
THESE VICKERS COMPONENTS ARE INCLUDED IN THE ELOX SYSTEM



HYDRAULIC CYLINDERS—Low frictional drag and dependable operation of the 3-inch bore, 12-inch stroke cylinders makes them ideal for the Elox machine shown. Vickers builds a complete line of cylinders and offers a wide choice of mounting options, rod end threads, wrench flats, port positions and connections. Standard bore sizes range from 1½" to 8" with either standard or heavy duty rods; special designs can be provided to suit every application. For more details ask for Bulletin 60-68.



SERVO VALVES—Extremely critical requirements for low deadband and high response for instantaneous reversals to clear the electrode dictated the selection of a Vickers servo valve for the Elox spark discharge machine. Three series of Vickers servo valves are available to meet every type of industrial application: a single stage valve rated at 0-3 gpm and two series of 2-stage servo valves for flows of 0-17 gpm and 0-37 gpm. For more details ask for Bulletins 59-74, 61-79.



POWER PACKAGE—The standard Vickers T-10 power package supplies the steady pressure required for optimum operation of the Elox electrical discharge machine. A vane pump and relief valve matched to the system plus the basic tank unit constitute the power package. Vickers builds the most complete range of power packages available anywhere—all components "matched" in output to insure optimum performance and reliability. For more data on how these power packages can simplify your design and procurement problems, contact your Vickers Application Engineer.

Don't Miss Booth 549
Design Engineering Show
Detroit, May 22-25

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DIVISION OF SPERRY RAND CORPORATION
Machinery Hydraulics Division
ADMINISTRATIVE and ENGINEERING CENTER
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CALENDAR
OF MEETINGS

May 24-25, American Iron & Steel Institute: Annual meeting, Waldorf-Astoria Hotel, New York. Institute's address: 150 E. 42nd St., New York 17, N. Y. Secretary: George S. Rose.

May 24-26, Electronic Industries Association: Annual convention, Pick-Congress Hotel, Chicago. Association's address: 1721 DeSales St. N.W., Washington 6, D. C. Secretary: James D. Secrest.

June 4-7, American Gear Manufacturers Association: Annual meeting, The Homestead, Hot Springs, Va. Association's address: 1 Thomas Circle N.W., Washington 5, D. C. Executive director: J. C. Sears.

June 4-7, National Association of Purchasing Agents: Annual meeting and exhibit, Conrad Hilton Hotel, Chicago. Association's address: 11 Park Place, New York 7, N. Y. Executive secretary: G. W. H. Ahl.

June 5-7, American Society for Quality Control: Annual convention and exhibit, Sheraton Hotel, Philadelphia. Society's address: 161 W. Wisconsin Ave., Milwaukee 3, Wis. Administrative secretary: W. P. Youngclaus Jr.

June 5-9, Society of Automotive Engineers: Summer meeting, Chase-Park Plaza Hotels, St. Louis. Society's address: 485 Lexington Ave., New York 17, N. Y. Secretary and general manager: Joseph Gilbert.

June 5-9, Society of the Plastics Industry Inc.: National conference and show, Commodore Hotel, New York. Society's address: 250 Park Ave., New York 17, N. Y. Executive vice president: William T. Cruse.

June 6-8, Instrument Society of America: Summer conference and exhibit, Toronto, Ont. Society's address: 313 Sixth Ave., Pittsburgh 22, Pa. Executive director: William H. Kushnick.

June 8-9, Malleable Founders Society: Annual meeting, The Broadmoor, Colorado Springs, Colo. Society's address: 781 Union Commerce Bldg., Cleveland 14, Ohio. Executive vice president: Lowell D. Ryan.

June 11-15, Air Pollution Control Association: Convention and exhibit, Hotel Commodore, New York. Association's address: 4400 Fifth Ave., Pittsburgh 13, Pa. Executive secretary: Arnold Arch.

June 14-17, Drop Forging Association: Annual meeting, The Greenbrier, White Sulphur Springs, W. Va. Association's address: 55 Public Square, Cleveland 13, Ohio. Executive vice president: Dwight M. Allgood.

ROBERT WEBB, RESEARCH DIRECTOR, ELOX CORPORATION SAYS:

"Jointly developed hydraulic system provides fast response needed for spark machining..."

"When people have a problem that can be solved with three-dimensional electric discharge machining, they come to Elox for our special skills and knowledge. Similarly, we insure that our machines offer the last word in performance by working as a team with components and systems manufacturers.

"To produce cavity dies like the one shown above, we designed and built a machine with a precision table and a vertical slide accuracy that we can guarantee within .0005" to 12 inches. We were able to develop a hydraulic circuit for the vertical slide and get a faster response than with any other method because Vickers engineers understood our problems thoroughly and cooperated fully in effecting their solution.

"Speed of response is half the story; the other is precise maintenance of the spark gap without 'hunting'—enabling the spark machining operation to be completed in the shortest possible cycle. Our hydraulic package meets all the foregoing requirements because the individual units are matched to each other and to the machine itself."

The Elox experience is typical of Vickers assistance to machinery builders and/or users in providing outstanding hydraulic equipment or systems to insure peak performance. Specialists working with the broadest line of top quality hydraulic components available anywhere give you a system ideally suited to your specific needs. See facing page for more details about the hydraulic components used by Elox and the entire Vickers line.

VICKERS®

VICKERS INCORPORATED

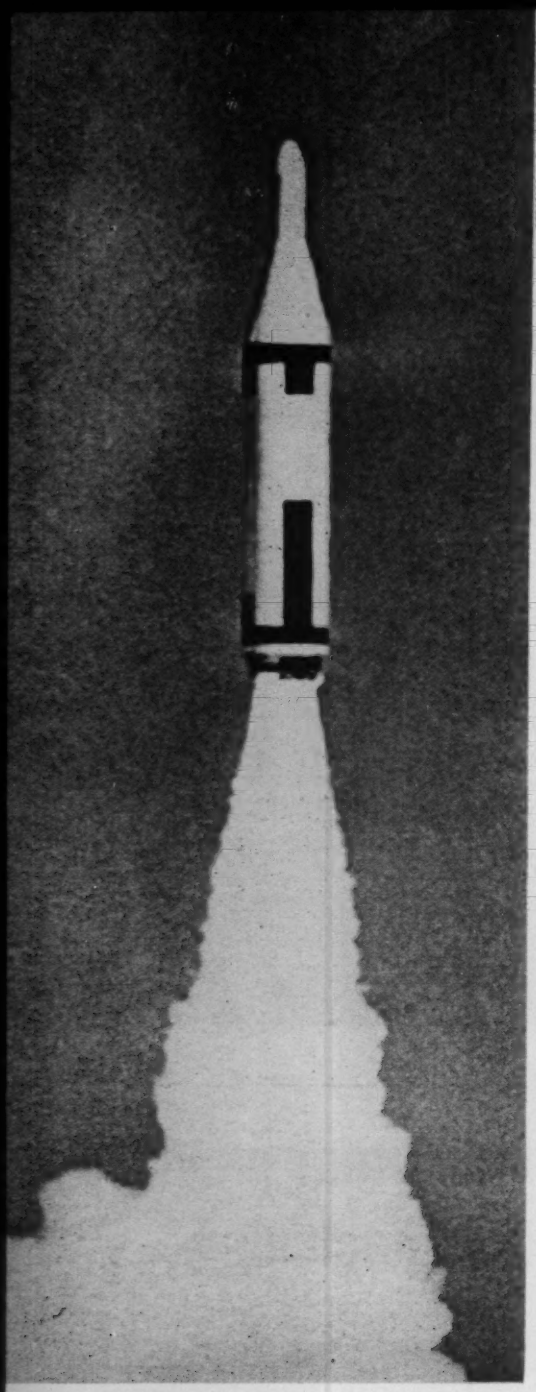
DIVISION OF SPERRY RAND CORPORATION

Machinery Hydraulics Division

ADMINISTRATIVE and ENGINEERING CENTER

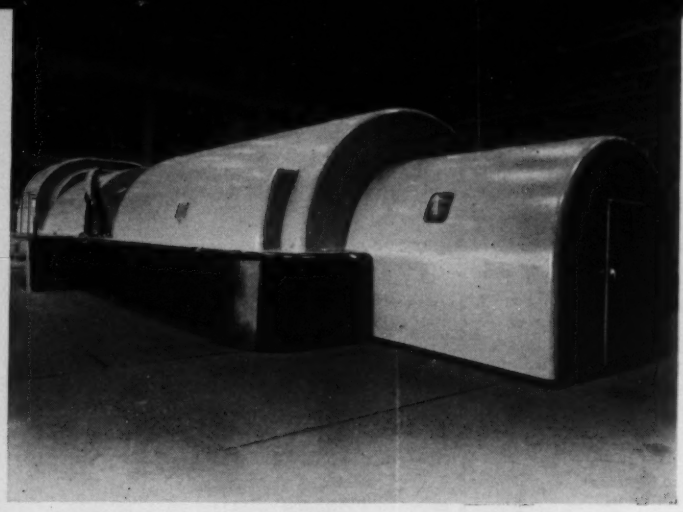
Department 1480 • Detroit 32, Michigan

9640

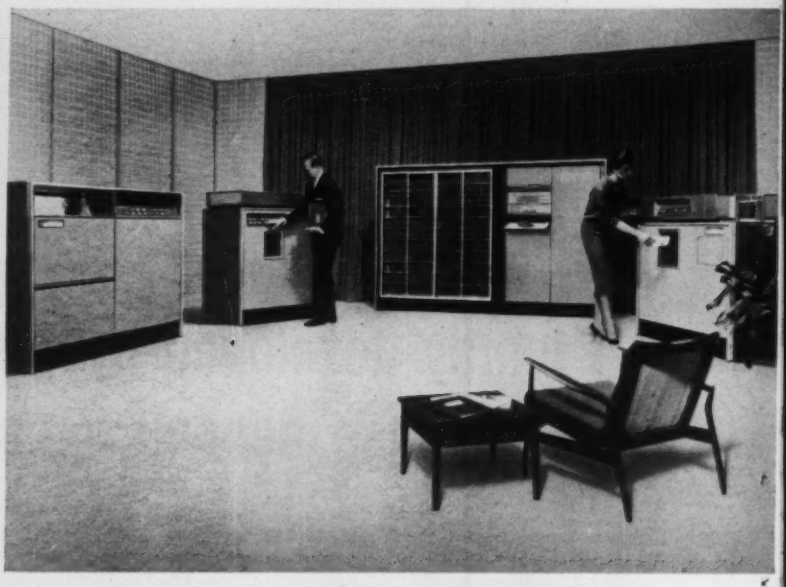


OFFICIAL U.S. NAVY PHOTOGRAPH

Three quarters of the globe serves as launching pad for this Polaris missile designed for subs. Carpenter Stainless forgings assure predictable performance.



Less heat, more power. Hydrogen gas cooling system on this fully super-charged steam turbine-generator uses thin-walled rectangular stainless tubing. For extra strength, uniformity Carpenter Stainless Type 304 was specified.



The "big brain". Carpenter Electronic Alloys provide vital links in these advanced solid-state computing systems. Example: Carpenter HyMu "80" strip is used for pickup heads to help guarantee the necessary high reliability.

Steel

you can do it consistently better with

The Carpenter Steel Company, Main Office and Mills, Reading, Pa.

High flying hybrid. "Blucket" is half fan blade, half turbine bucket. Made from Carpenter High Temperature Alloy V-57, "bluckets" are used in new jet engines for the world's fastest airliner. Here Carpenter quality provides extra measure of safety.

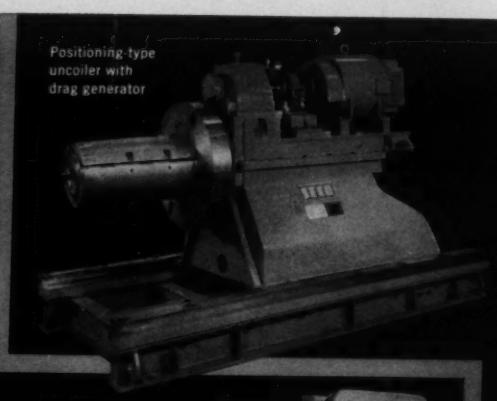
$50,000 toys. That's the cost of tooling up for one of these scale models. Manufacturer specifies "Carpenter No. 484 Tool Steel—no substitute."

Smiles and miles. Joy to pedal pushers everywhere are these bicycle speedometers. Pointer shafts must be reliable . . . are manufactured from Needle Wire from Carpenter's Webb Wire Division.

Coast to coast off-the-shelf specialty steel service is available in wide range of sizes and grades. Over twenty fully-stocked Carpenter SERVICE-CENTERS ...all staffed by trained specialists.

Carpenter Specialty Steels for Specialists

Alloy Tube Division, Union, N. J. / Webb Wire Division, New Brunswick, N. J. / Carpenter Steel of New England, Inc., Bridgeport, Conn.



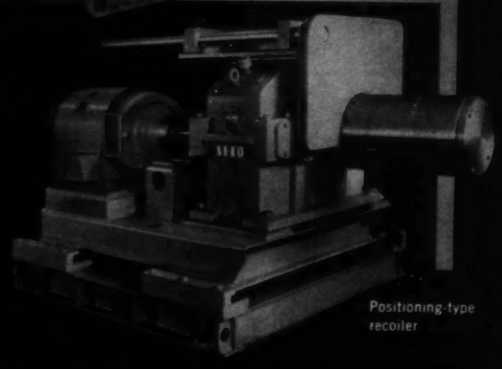
Positioning-type uncoiler with drag generator

Predictable Performance

for processing lines with

SECO

terminal equipment



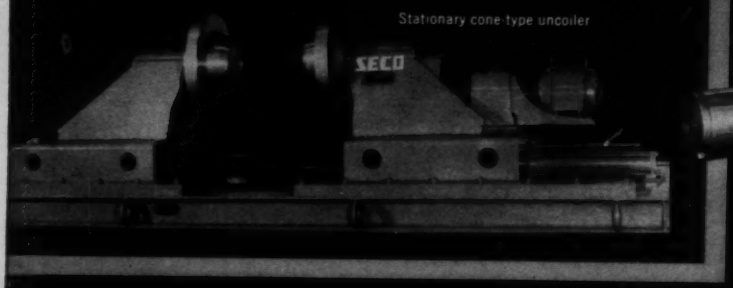
Positioning-type recoiler

From entry to exit, new and modernized processing lines . . . annealing, pickling and others . . . perform better with SECO terminal equipment. This equipment handles coils ranging from 10,000 to 50,000 pounds with speed, convenience, safety.

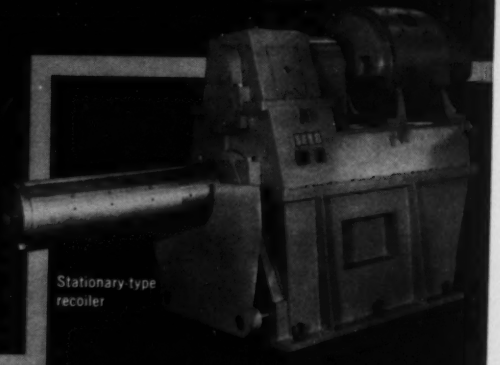
SECO uncoilers and recoilers are designed to operate at any speed the mill requires, are available in positioning or stationary types. The positioning types feature a slideable reel base mounted on a sub-base for alignment with the processing line, actuated by an automatic edge control.

SECO also makes auxiliary equipment such as coil cars with coil lifts to simplify uncoiler loading and recoiler unloading. Available for mandrel or cone-type reels.

A staff of trained sales engineers will assist you in finding the equipment best suited to your needs. Call or write today. West Coast representative: United Machine Tool Company, Los Angeles.



Stationary cone-type uncoiler



Stationary-type recoiler

SECO STEEL MILL EQUIPMENT

- Leveling and Shearing Lines
- Combination Edging and Flattening Lines
- Tension Reels for Strip Polishers
- Narrow Strip Grinding Machines
- Slitting Lines
- Multiple Strand Pull-out Rolls and Take-up Frames
- Strip Coilers (Up and Down Type)
- Traverse Reels for Narrow Strip
- Steel Coil Up-enders
- Scrap Bailers

STEEL EQUIPMENT COMPANY

P. O. BOX 737, WARRENSVILLE STATION • CLEVELAND 22, OHIO

Affiliated with Lee Wilson Engineering Co., Inc.

Here's what you can buy for cancer research— for $5 or $50 or $500,000!

You can give a cancer research laboratory five dozen glass culture tubes for $5, one instrument sterilizer for $50, one hundred medical fellowships for $500,000!

THERE ARE no bargains in cancer research. Hunting the cause of cancer—and ways of preventing cancer—is an exacting job. A demanding job. An *expensive* job. *It costs money.*

To give you an example, below are actual prices of equipment purchased with American Cancer Society funds. Little things, like glass slides. Massive things, like room-size total body radiation instruments. *All* vital to the fight against cancer.

So is your donation.

See what you can afford to buy. Then write that figure down on the coupon at the bottom of this page, and mail it with your contribution to CANCER, c/o your local Post Office. All gifts are tax deductible.

5 dozen tissue culture tubes $5

6 months' supply of rubber gloves $15

Food and care of 1500 mice for 1 day $15

1 dozen glass flasks for chemical studies $15

1 micrometer $19

1 mouth rebreathing apparatus and nebulizer .. $20

1 day's supply of radium needles $35

1 instrument sterilizer $50

1 blood cell calculator, used in leukemia studies $70

3 units of human serum $70

4 days' maintenance of a cancer research bed .. $100

1 water phantom for radiation dosage studies .. $100

1 kymograph manometer $134

100 AK mice for preparation of Coombs serum $150

1 egg incubator $150

1 constant temperature bath $200

1 isotope scanner $250

1 x-ray tube $480

2,000 millicuries of radioactive iodine $750

1 heart-lung machine for drug perfusion $2600

½ gram of cobalt 60 for radiation research .. $6000

1 grant for the study of the role of hormones in growth, including the cause, prevention and treatment of cancer $70,000

1 high-voltage, total body radiation instrument $100,000

100 training fellowships for 1 year $500,000

Grants to 5 scientists, each heading a cooperative 5-year research program $1,000,000

Guard your family. Fight cancer with a checkup and a check.

Mail this coupon to:
Cancer
c/o your local post office.

Attached is my gift of

$_____ to fight cancer.

My name _____

Address _____

City and State _____

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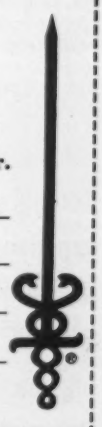
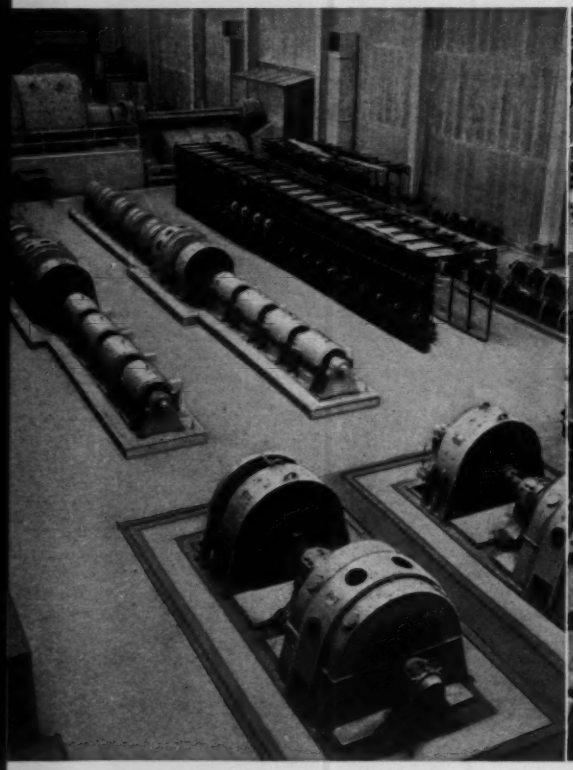
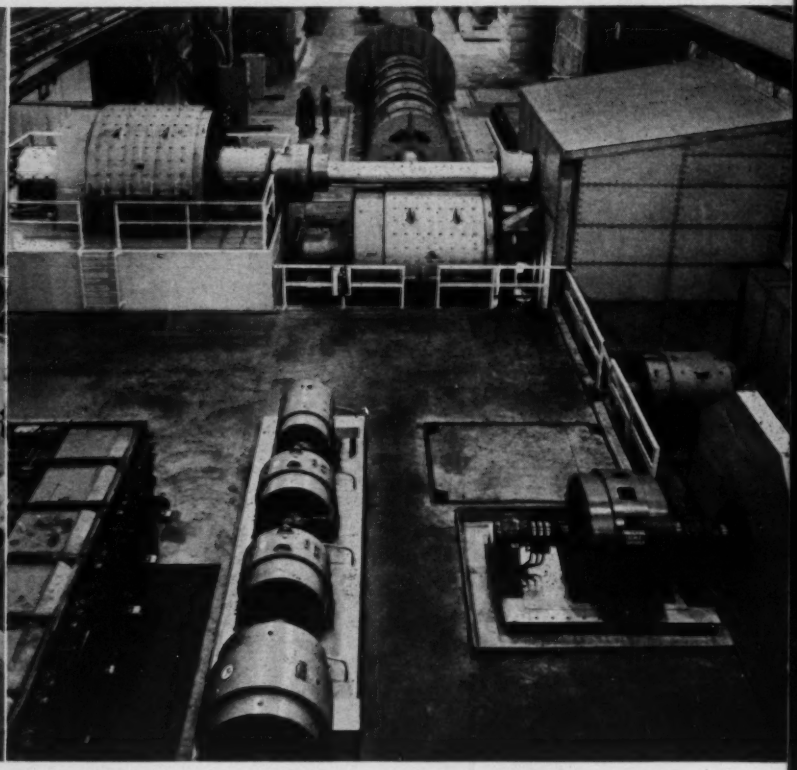
AMERICAN CANCER SOCIETY



Pick a process...any mill process...and discover the dynamic Allis-Chalmers leadership in

Power for Steel





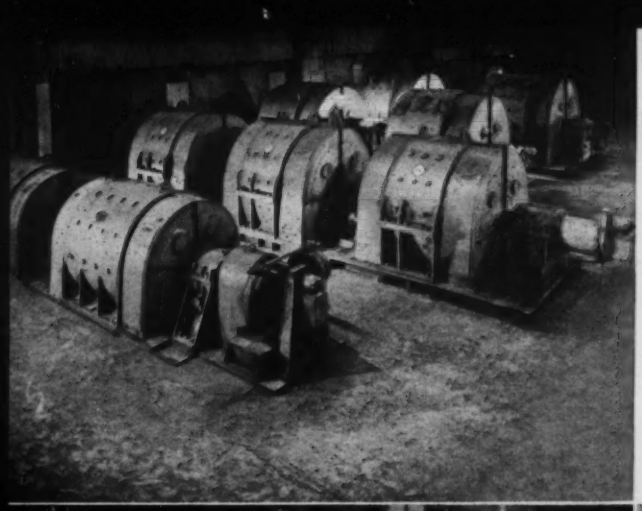
Allis-Chalmers power serves blooming mill: Installed in 1953, the 45-in. by 115-in. blooming mill at Granite City Steel operates as a high-lift slabbing mill. It's powered with an Allis-Chalmers 10,000-hp twin drive, 40/80-rpm reversing motor. Additional A-C equipment includes switchgear, direct-current control, constant and variable-voltage m-g sets, and REGULEX exciter sets.

Hot strip mill upgraded: Granite City Steel's hot strip mill has been continuously upgraded to increase tonnage and quality. A four-stand finishing train, installed in 1936, was upgraded in 1941 with the addition of a fifth finishing stand. In 1952, a three-high rougher was replaced with a four-high reversing rougher — horsepower was increased from 3000 hp to 7000 hp plus a 1000-hp edger. Horsepower of the finishing train was later increased by raising bus voltage from 600 to 650 volts. Now, an Allis-Chalmers feedback automatic gage control is being installed to increase quality of strip.

Throughout the mills at Granite City Steel are numerous examples of Allis-Chalmers leadership and experience in power for steel. A-C equipment is used in virtually all operations—rolling mills, processing lines, sintering plant, and power plant. All demonstrate the extra value that is standard with A-C products, systems and services. Allis-Chalmers can also help you serve tomorrow's changing markets profitably. See your A-C representative or write directly to Allis-Chalmers, Industries Group, Milwaukee 1, Wisconsin.

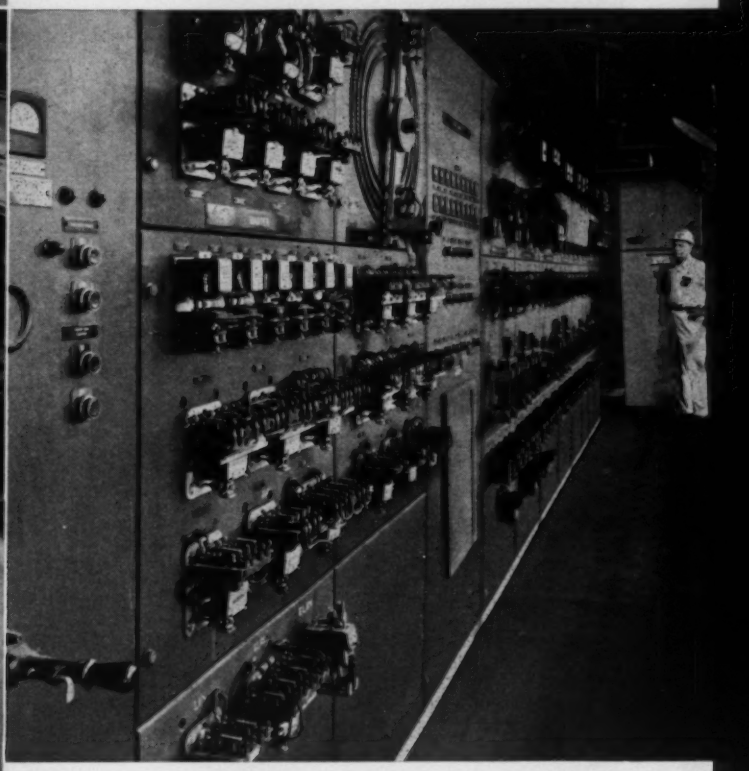
A-1454

Regulex is an Allis-Chalmers trademark.



A-C cooperation limits "changeover" downtime: In 1958, Granite City Steel's four-stand cold strip mill was modernized to increase sheet-gage tonnages by 35%. Downtime for the changeover (from 9600 hp at 2800 fpm to 18,700 hp at 3600 fpm) was three weeks. A-C installed motors, m-g sets and 400-cycle control. Now being constructed are the motors, control, and a feedback automatic gage control for a new 40-in. Sendzimir mill.

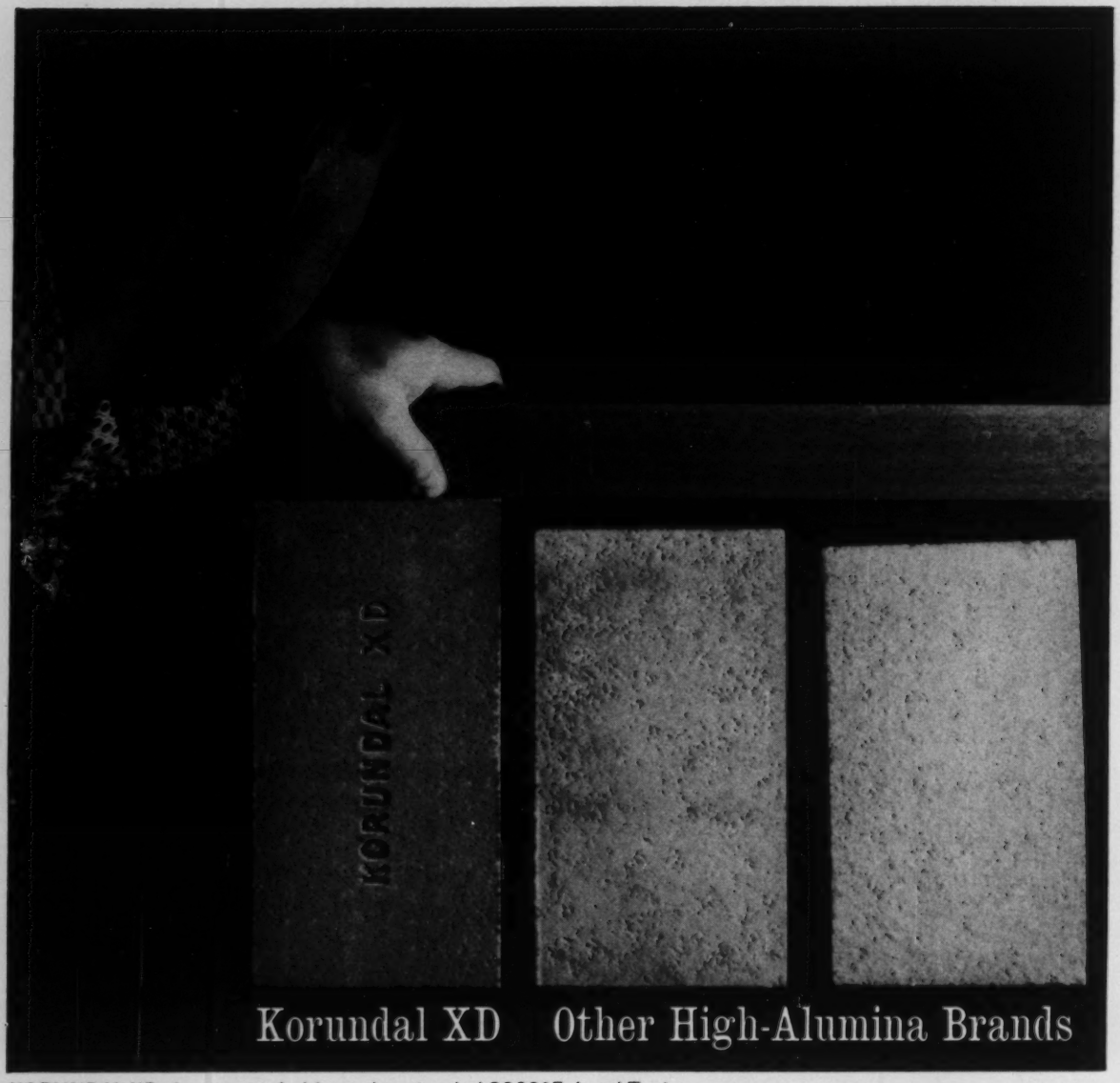
Allis-Chalmers powers shearing line: Allis-Chalmers direct-current adjustable-voltage control and direct-current drives provide accurate shearing of sheets at speeds up to 1000 feet per minute. A magnetic piler, incorporated in this line, assures careful handling of sheets.



Sixty-eight motors power plating rolls: When this electrolytic tinning line went into operation in 1960, sixty-eight 5-hp Allis-Chalmers totally enclosed, fan-cooled dc gearmotors powered the plating rolls. Additional Allis-Chalmers motors and supporting motor-generator sets provide power throughout the line. Allis-Chalmers motors and supporting variable-voltage motor-generator sets also serve a high-speed continuous annealing line at Granite City Steel Company.

ALLIS-CHALMERS PRODUCTS FOR THE STEEL INDUSTRY: Allis-Chalmers serves the steel industry with motors, m-g sets, engine-generator sets, controls, rectifiers, switchgear, transformers, circuit breakers, steam turbine generators, condensers, compressors, pumps, materials handling equipment, crushers, grinding mills, kilns and screens.

ALLIS-CHALMERS



KORUNDAL XD shows no subsidence in extended 3000°F. Load Test

Test shows amazing Hot Load Capacity of new Harbison-Walker Refractory

The hot load test results on KORUNDAL XD compared with similar high-alumina brands are most revealing. Whereas, KORUNDAL XD showed no subsidence in a special, severe load test at 3000°F., the other brands in the same test deformed 5.1% and 9.6% (see above photo).

KORUNDAL XD is very dense, strong, and has good resistance to thermal shock. This unprecedented combination of high hot strength and improved physical properties will suggest solutions for many of your furnace problems. Our engineers will be glad to give you complete technical information.

HARBISON-WALKER REFRACTORIES COMPANY

AND SUBSIDIARIES

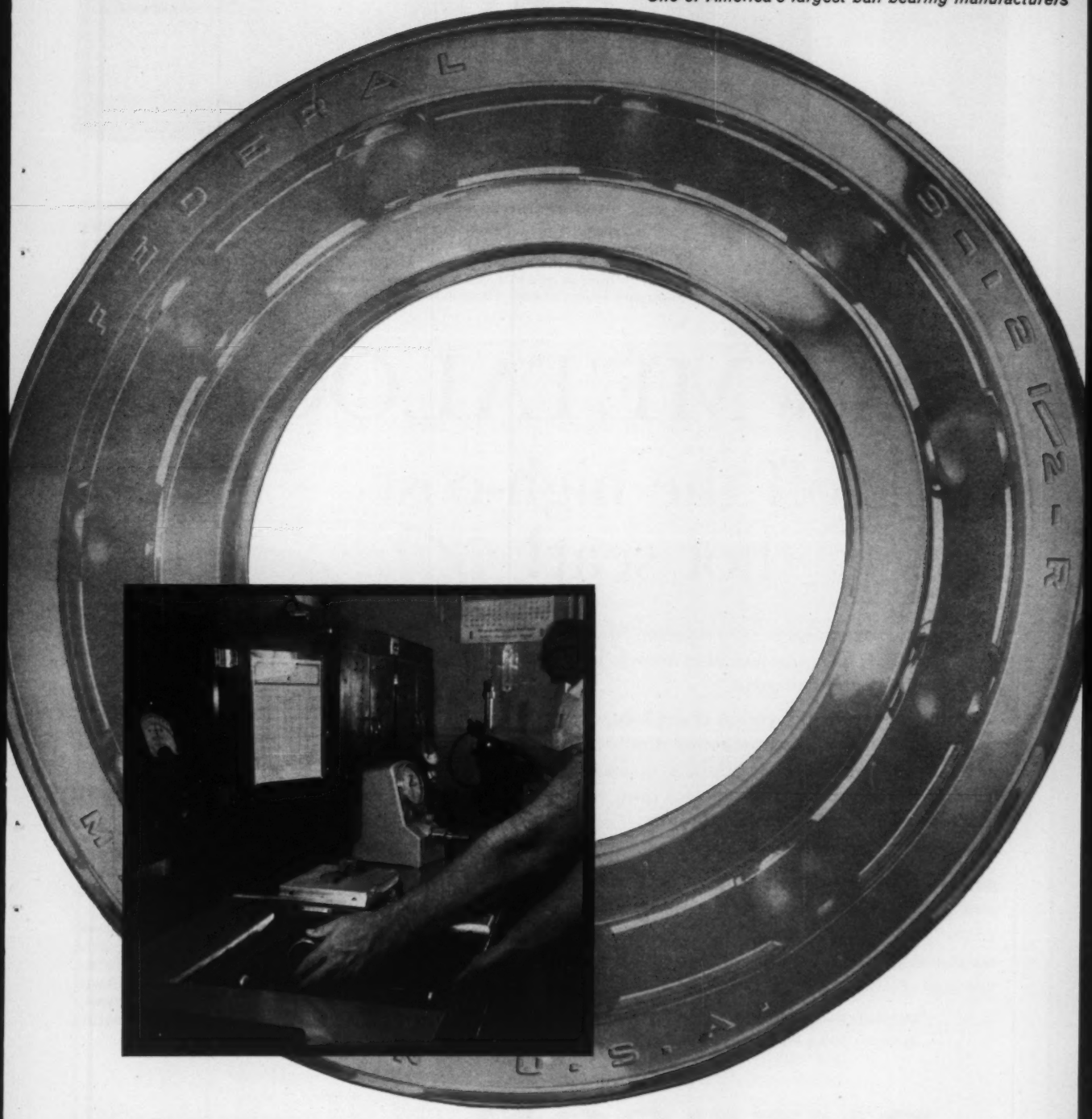
WORLD'S MOST COMPLETE REFRACTORIES SERVICE

General Offices: Pittsburgh 22, Penna.

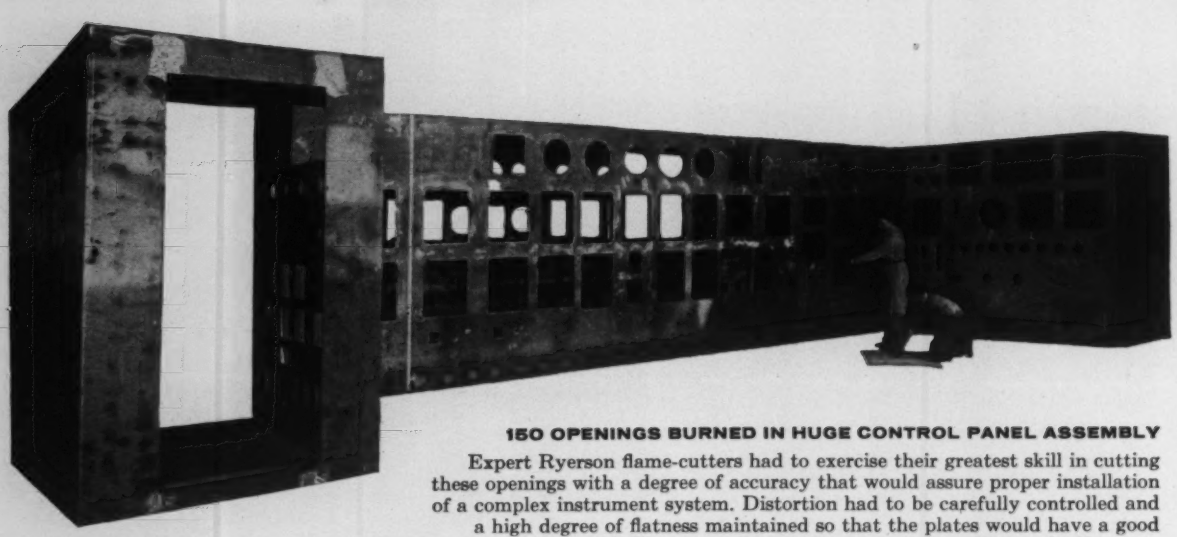
HW 61-3

Federal
BALL BEARINGS

One of America's largest ball bearing manufacturers



Precisely how precise can you get? Never too much so for Federal's standards. That's why even our master gages have gages to keep them "on the button". In this specially air-conditioned room, we calibrate our master inspection gages on a machine accurate to within 0.000010"! It's one way we insure dimensional accuracy in every Federal ball bearing—radial, angular contact, thrust, self-aligning or shafted. Single or double row. Open or sealed. There are hundreds of types, in all sizes. Send for our catalog today. The Federal Bearings Co., Inc., Poughkeepsie, New York.



150 OPENINGS BURNED IN HUGE CONTROL PANEL ASSEMBLY

Expert Ryerson flame-cutters had to exercise their greatest skill in cutting these openings with a degree of accuracy that would assure proper installation of a complex instrument system. Distortion had to be carefully controlled and a high degree of flatness maintained so that the plates would have a good appearance when painted. These exacting requirements were readily met by Ryerson.

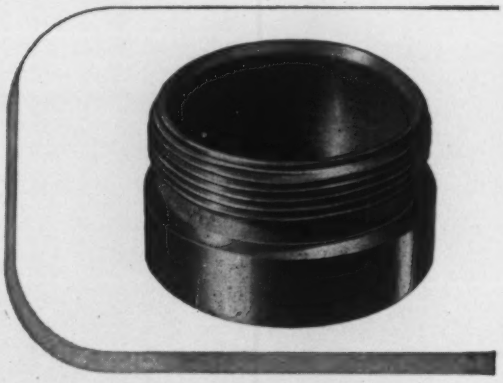
How METALOGICS* cools off the high-cost hot seat!

Here are two examples of how Ryerson Metalogics helps hundreds of companies save money, improve their products and cut costs.

Metalogics-trained Ryerson specialists help you value-analyze high-cost production problems—and give you unbiased recommendations on exactly the right steel, aluminum or plastic, plus the best methods of fabrication, to do the job.

Little wonder, then, that more and more companies across the country find the high-cost hot seat a little cooler after inviting a Ryerson man to value-analyze specific problems and come up with recommendations. Is your company taking full advantage of this unique service?

***Metalogics—the Ryerson science of giving optimum value for every purchasing dollar.**



SUGGESTION ELIMINATES THREAD GALLING

Manufacturer made this special coupling of aluminum to gain the advantages of light weight, corrosion resistance and easy machining. But galling of threads presented a problem.

Following the recommendation of a Ryerson Metalogics specialist, the company hard-coated the parts by special low-temperature anodizing, which produced a surface hardness of Rockwell 70 C. Galling was eliminated, and corrosion resistance increased. One more example of cost-cutting technical help from Ryerson.

RYERSON METALOGICS

JOSEPH T. RYERSON & SON, INC., MEMBER OF THE INLAND STEEL FAMILY

STEEL · ALUMINUM · PLASTICS · METALWORKING MACHINERY

4000 Firms Worked on Mercury Capsule

The success of the Project Mercury firing was dependent on the reliability of products made by 4000 firms. McDonnell Aircraft Co., prime contractor for the space capsule, told STEEL that it had 565 direct suppliers and subcontractors for the project, that there were 1500 suppliers in the second tier, and an estimated 4000 total suppliers. In the photo at right, a McDonnell engineer shows how Alan Shepard entered the Mercury spacecraft. At left, Douglas Y. Smith, general manager of Radio Corp. of America's Electron Tube Div., points to the spot on the drawing of the capsule where two pencil-thin tubes (like the one he is holding) powered the voice of America's first astronaut. Among other metalworking suppliers: Thiokol Chemical Corp.'s Elkton Div. developed and produced the three small rockets that provided braking power during re-entry. Titanium Metals Corp. of America and Republic Steel Corp. supplied titanium. Johns-Manville Corp. supplied two types of thermal insulations, one with thermal conductivity lower than that of still air. Rocketdyne Div., North American Aviation Inc., produced the Redstone A-7 rocket engine that powered the capsule into space.

'The Spirit of Cape Canaveral'

Metalworking managers last week were expressing disgust at the Cape Canaveral labor featherbedding exposed by a Senate investigating committee. Jack Cannady, cost control chief for Convair Div., General Dynamics Corp., told the committee that his company invented jobs for union employees, at a cost of $692,000 to the taxpayer, to prevent strikes during work on the Atlas missile. He also said that costs were increased by $453,062 due to subcontracting nearly 100,000 electrical connections a year to firms hiring employees associated with the International Brotherhood of Electrical Workers. He said Convair's technicians, members of the International Association of Machinists, could make eight connections an hour, but the IBEW members averaged only half that.

Professor Calls for Consumer Tax Incentives

Federal tax incentives for consumer investments in durable goods would provide a powerful stimulus to full employment and long term economic growth, asserts Prof. George Katona of the University of Michigan. He suggests that tax credits be given to buyers of houses, autos, and large appliances, and to persons making additions and repairs to their homes. He says

such consumer investments should receive tax treatment "broadly comparable to the incentives recently recommended by President Kennedy on business expenditures for new plant and equipment."

Douglas and the Dunes: Fight Rages On

Sen. Paul Douglas (D., Ill.) has asserted that Indiana will get federal money for a proposed Lake Michigan port "over my dead body" if the Hoosiers continue to resist the senator's proposals to turn the Indiana Dunes into a recreational area. (He made the comment to an Associated Press reporter.) Senator Douglas has submitted a new bill which would set aside 3000 acres as a scientific preserve and 1000 acres as a recreation area. He was frustrated last year in an effort to turn the 5000 acre site into a national park, when his idea was opposed by Indiana senators and the steel companies that own most of the land.

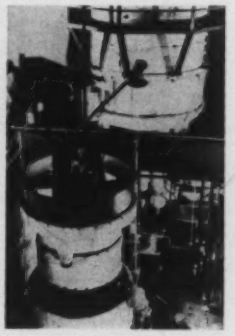
UAW and Ford Will Open Contract Talks June 29

The United Auto Workers and Ford Motor Co. will open contract negotiations June 29, slightly earlier than normal. Negotiations with General Motors Corp. and Chrysler Corp. are expected to start a few days after the Ford talks. Contracts with all three firms expire Aug. 31.

How March Imports and Exports Compare

March imports totaled $1.23 billion—18 per cent above the February level, the Commerce Department reports. On a seasonally adjusted basis, the gain amounted to less than 1 per cent. March merchandise exports rose 18 per cent above the February mark to $1.89 billion. Seasonally adjusted, the March level was 4 per cent below that of February.

Fairbanks Whitney Unveils Desalting Equipment



This is the first picture of the new desalting equipment developed by Fairbanks Whitney Corp. in co-operation with the Israeli government. At top right is the hydroconverter that turns the sea water into vapor, ice, and concentrated brine. At lower left is the counterwasher that cleans the brine from the ice and directs the pure ice into a melting chamber from which it emerges as fresh water. The firm says the equipment will produce fresh water for less than $1 per 1000 gallons. The first unit will produce 250,000 gallons daily.

Pension Funds Keep Growing

Assets of the pension funds of U. S. corporations reached $28.7 billion in book value at the end of 1960, reports the Securities & Exchange Commission. Assets were enlarged by $3.4 billion (13.5 per cent) during the year. Growth in 1959 totaled $3.2 billion, in 1958, $2.8 billion.

Buying or Selling . . . Long Term Contracts Can Pay Off

After a one year study, Tom Ritter, general manager of supply sales, Strong, Carlisle & Hammond, Cleveland, has become a firm advocate of long term purchase agreements. In one case, the mill supply house saved a customer 15 per cent on buying fasteners by programing inventory and production cycles and setting up a standardized purchasing system. There are pros and cons about long term contracts, but 19 out of 20 executives predict their usage will grow. See Page 60.

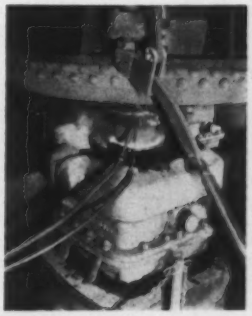
Great Lakes Steel Reports May Order Upturn

May orders for steel are 30 per cent above April's level, says Wilfred D. MacDonnell, president, Great Lakes Steel Corp., Detroit division of National Steel Corp. He adds: The division is supplying hot bands to National's new Midwest Steel Div., Portage, Ind., and Great Lakes will be able to ship 20 per cent of its capacity to Midwest. Long range programing calls for steelmaking facilities to be installed at Midwest when automotive production hits 9 million units annually.

Steel vs. Aluminum: The Cold War Gets Hotter

The competition between steel and aluminum is getting harsher every week, especially in automotive and construction applications. One example: Last week, Great Lakes Steel Corp. called a group of editors together to show a series of steel vs. aluminum bumper test demonstrations. Referring to the steel vs. aluminum battle for markets, Mr. MacDonnell, president of Great Lakes, told the editors: "We are now taking our gloves off."

Finkl Ups Quality of Aircraft Steels



This photo shows how A. Finkl & Sons Co. pours vacuum degassed, nickel-chrome-moly steel through a blanket of argon gas into an ingot mold filled with argon gas. The method keeps oxygen from reaching the molten steel after it has been degassed. The firm has also developed a method to put additives into the molten steel while the ladle is under a high vacuum inside the vacuum degassing chamber. It makes for cleaner, tougher steel, says the firm.

World Aluminum Output Jumps; Capacity Keeps Pace

World production of primary aluminum in 1960 totaled 5 million short tons —11 per cent above the '59 mark, reports the Commerce Department. U. S. production increased 3 per cent in 1960 and accounted for 40 per cent of the world total. The Soviet Bloc accounted for 21 per cent, Canada for 15 per cent, France for 5 per cent, West Germany and Norway for 4 per cent each, and Japan for 3 per cent. World capacity at yearend is estimated at 5.9 million tons. New expansion underway or planned will boost capacity

STEEL The Metalworking Weekly

May 15, 1961 Vol. 148 No. 20

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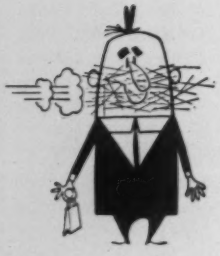
by 2.5 million tons. Norway will add 210,000 tons; Australia and New Zealand 163,000; Ghana 150,000; Japan 150,000; West Germany 110,000; France 90,000; India 70,000; Surinam 60,000; Greece 57,000. Expansion in the Soviet Bloc could add 1 million tons or more, says Commerce, but details are not available. Small projects are planned in Brazil, Angola, Yugoslavia, Venezuela, Spain, Mexico, Italy, Taiwan, and Switzerland.

How First Quarter Profits Stacked Up

A check of earnings reports of 539 manufacturing firms by the First National City Bank of New York found a decrease in net profits of 14 per cent from the last quarter of 1960 and a shrinkage of 22 per cent from the first quarter of 1960. Here's a comparison by industry, showing the change from 1960's first quarter . . .

All Manufacturing	−22%	Nonferrous Metals	−22%
Iron & Steel	−74%	Autos & Parts	−46%
Electrical Equipment	−28%	Other Transportation Equipment	+25%
Machinery	+17%	Other Metal Products	−19%

Straws in the Wind



Algoma Steel Corp. Ltd. has tapped the first commercial size heat of uranium-bearing steel . . . Inventories of manufacturing firms fell $250 million (seasonally adjusted) in March. The Commerce Department says that a $350 million drop in durables was partially offset by a rise in nondurables . . . U. S. Steel Foundation Inc. has announced a $2,775,000 program of aid to education . . . Exports of business machines from the U. S. increased 43 per cent in 1960 vs. 1959 (to $209 million) and imports rose 47 per cent (to $76.5 million) . . . An Air Force surplus aluminum extrusion plant in Adrian, Mich., has been sold to Harvey Aluminum Co. for $3,626,100 . . . Aerojet-General Corp. successfully test fired a segmented, solid fuel rocket motor developing 160,000 lb of thrust (for the Air Force) . . . More than $87 million worth of industrial facilities in the U. S. and Canada were destroyed in 133 "large loss" fires last year—$29.5 million more than the loss in 1959, says the National Fire Protection Association . . . Small Business Administration loan approvals reached a record in March . . . Jones & Laughlin Steel Corp. has developed a new, nickel-copper-titanium, high strength, low alloy, steel with 50,000 psi minimum yield and 70,000 psi minimum tensile . . . DuPont has unveiled a versatile new chemical that reportedly can make cutting tools almost as hard as diamonds. It's called Baymal.

Metalworking Pulse

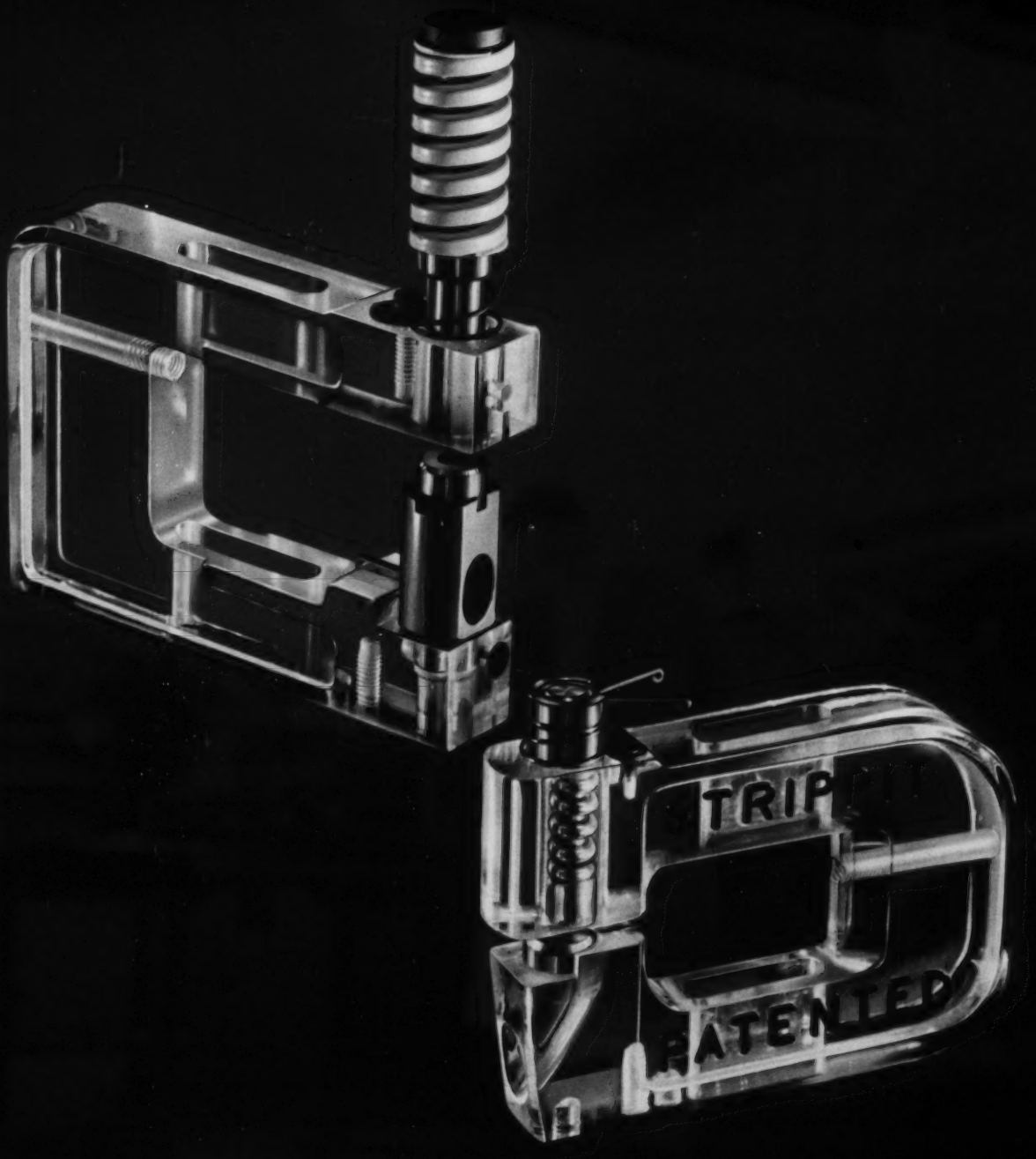
The Business Trend: STEEL's industrial production index has advanced in seven consecutive weeks. It's now only 3 points below the year-ago level. Mainly responsible: Steel and autos. **Autos:** Makers have boosted schedules almost every other week since early April. Look for output to fluctuate between 120,000 and 130,000 units a week during the rest of this quarter. **Steel:** Production attained the 2 million ton mark for the first time since the week ended May 21, 1960.

- **INDUSTRIAL PRODUCTION INDEX**
  (1947-49=100)
  Week ended May 6 .... 159†
  Year ago 162
  Details on Page 77

- **PASSENGER CAR OUTPUT (UNITS)**
  Week ended May 13 125,000*
  Year ago 145,917
  Details on Page 74

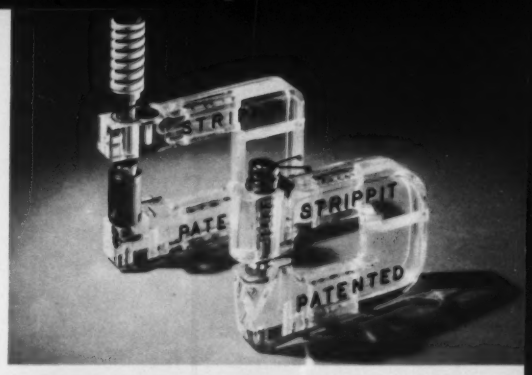
- **STEEL INGOT OUTPUT (TONS)**
  Week ended May 13 2,000,000*
  Week ago 1,943,000
  Details on Page 175

†Preliminary. *Estimated.

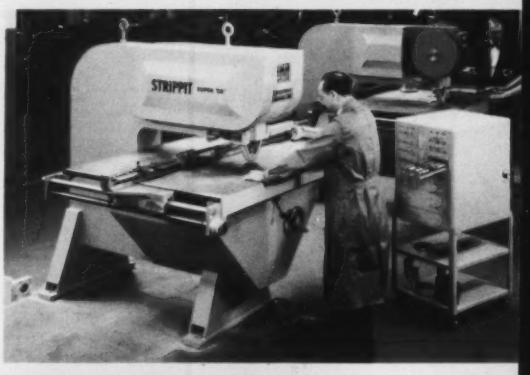


Get the inside story on cost saving STRIPPIT hole-punching units at the tool show-booth 1305

STRIPPIT bares all at the Tool Show. In addition to these transparent plexiglass holders that show exactly how STRIPPIT "BN" and "CJ" self-contained hole punching units are put together, you'll see actual demonstrations of STRIPPIT machinery in action and a display of all the other cost-cutting STRIPPIT sheet metal hole punching and notching units.

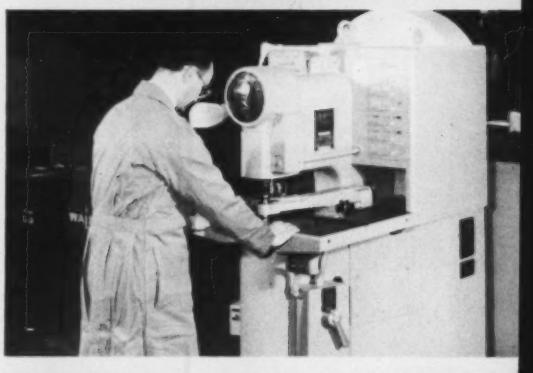


STRIPPIT Super 30 Fabricator punches round and shaped holes in workpieces 60" wide—any length. This amazingly versatile machine will also punch close-centered hole clusters in any material up to ¼" thick ... notch and nibble square or contour cutouts in ⅛" material. Standard and special tools interchange in seconds. The Super 30 also features an indexed tool holder, micrometric gaging and an adjustable work table.

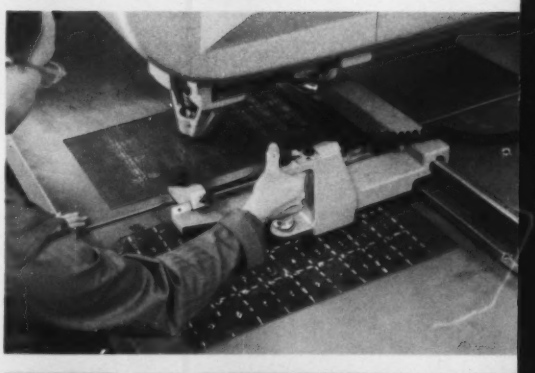


Stop at booth 1305 for positive proof that STRIPPIT cuts costs

STRIPPIT 15-A Fabricator saves you days or even weeks of time by eliminating tool designing and die-making. A new unique micrometric gaging system enables you to punch complicated patterns of round and shaped holes directly on this machine ... to exact layout specifications ... in minutes. The STRIPPIT 15-A also notches and nibbles sheet material.



STRIPPIT Duplicator functions like a pantograph to reproduce any hole pattern from a drilled or punched template. No custom dies are needed to turn out precision sheet metal parts in volume. The STRIPPIT Duplicator is a valuable accessory for both the Super 30 and 15-A Fabricators.



WALES **STRIPPIT** INC.

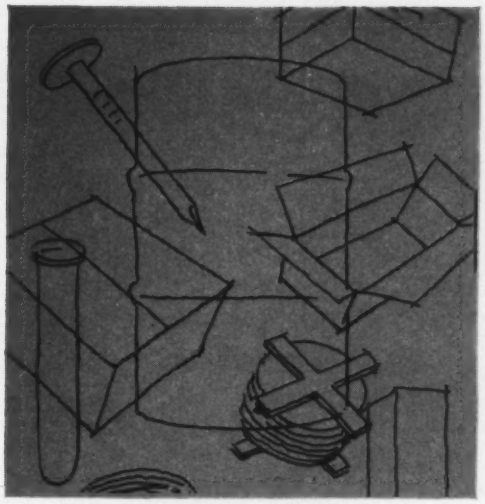
Buell Road • Akron, New York

A UNIT OF HOUDAILLE INDUSTRIES INC

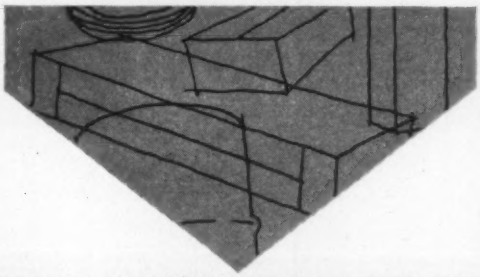
In Canada: Strippit Tool & Machine Company, Brampton, Ont.; In Continental Europe: Raskin, S. A., Lausanne, Switzerland; In the British Isles: E. H. Jones (Machine Tools) Ltd., Hove, Sussex, England.

STRIPPIT Flex-O-Drill drills, reams, center punches and scribes with tool room accuracy ... +.002". By eliminating the need for base line drawings and vernier height gages, the Flex-O-Drill can reduce template making time 50% or more. Want an accurate machine for checking drawings, patterns, templates or production pieces? A new, inexpensive accessory converts the Flex-O-Drill to this dual purpose.

VISIT OUR BOOTH '61 ASTME TOOL EXPOSITION



NOW! "CHECK WEIGHING" CAN BE MORE ACCURATE...MORE ECONOMICAL!



FAIRBANKS-MORSE BENCH AND PORTABLE "FLOAXIAL" DIAL SCALES

Now you can "check weigh" anything for industry (from a one-pound can to a one-ton barrel), in, out, or all about more accurately—more economically! Modern Fairbanks-Morse Dial Scales provide proved accuracy that works for you, year after year. And—because our Scales are built to last longer, you realize long-life economy . . . freedom from repairs or early replacements!

PROVED ACCURACY! Our "Floaxial" Dial Scales are famous for proved accuracy! Exclusive "Floaxial" mechanism eliminates knife edge or pin point pivots, features hard bronze fully adjustable cams, full-floating pendulums. Shielded ball bearings and corrosion resistant working parts assure free movement.

EASIER TO USE! Easy to use and move. Dial head swivels full 360° to any position. Rubber-tired wheels lock and/or Dial mechanism locks. Cast aluminum construction cuts weight.

EASY TO READ! Red knife blade indicator picks out just one scale graduation at a time. Special indicator tip eliminates parallax. Black numerals on brushed aluminum dial. No paint to peel, crack, or craze.

LONG-LIFE SERVICE! Rugged lever systems take shocks of dropping loads and stay accurate! Pivots are hardened steel with precision ground knife edges.

CAPACITIES: BENCH AND PORTABLE DIAL SCALES: Available in capacities from 50-3200 lbs.

3 PLATFORM SIZES: 18" x 20", 21" x 29", 30" x 30" available for both Bench and Portable Dial Scales.

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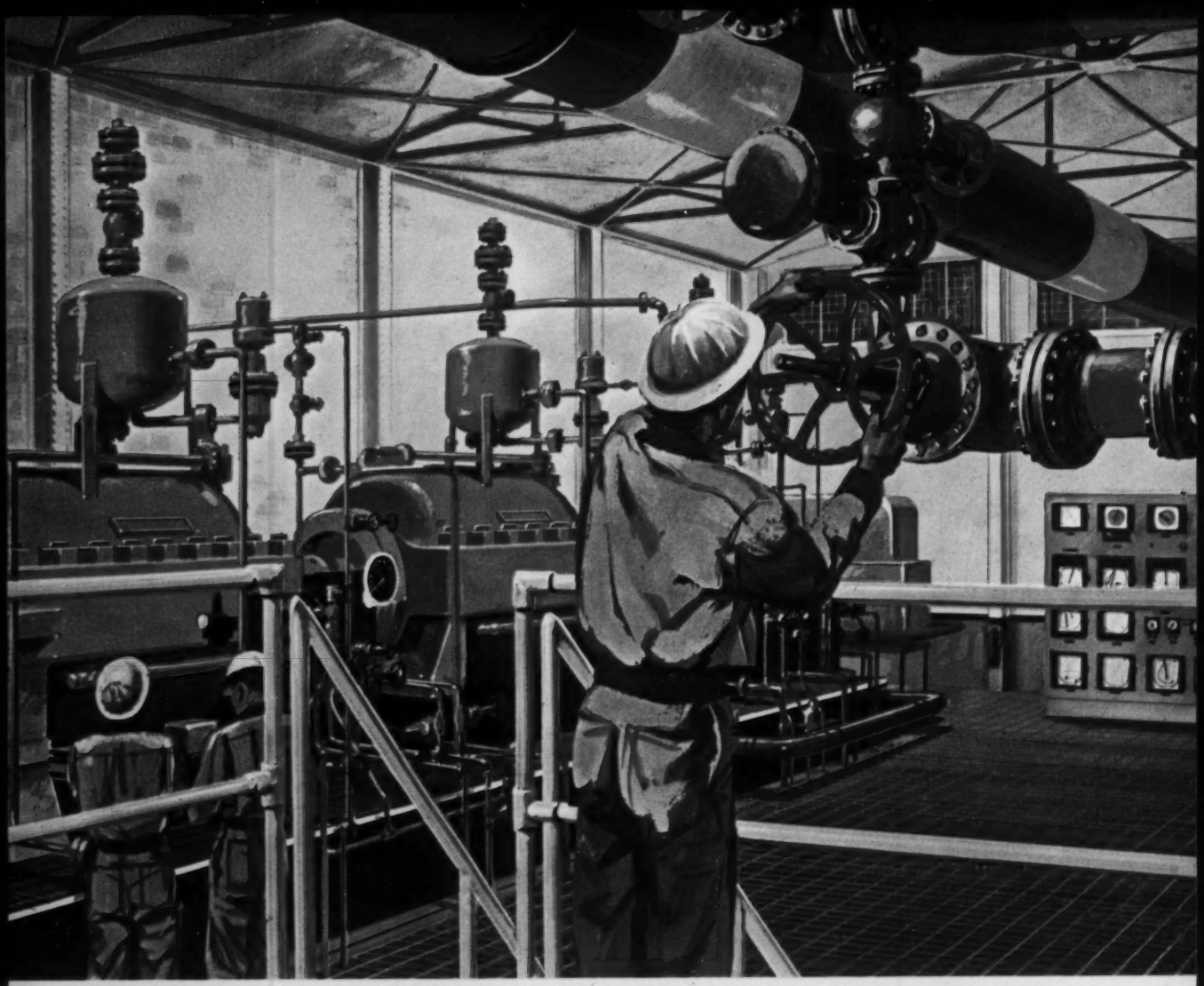

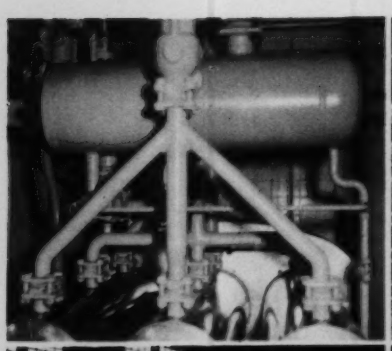

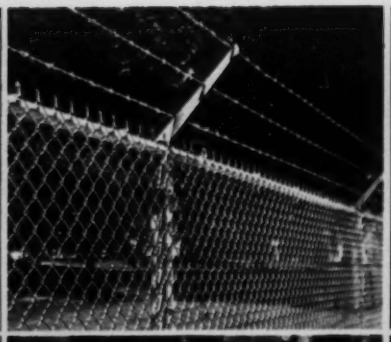

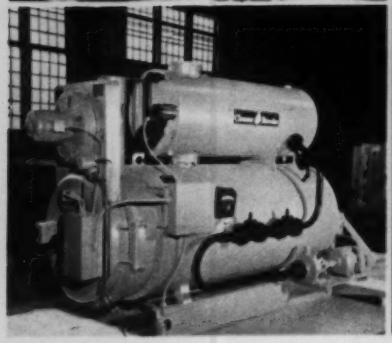

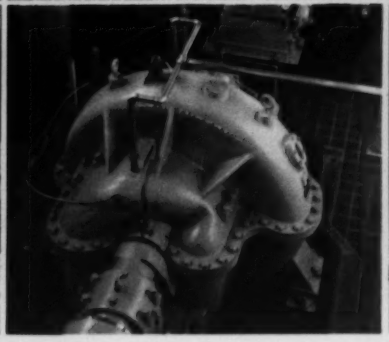

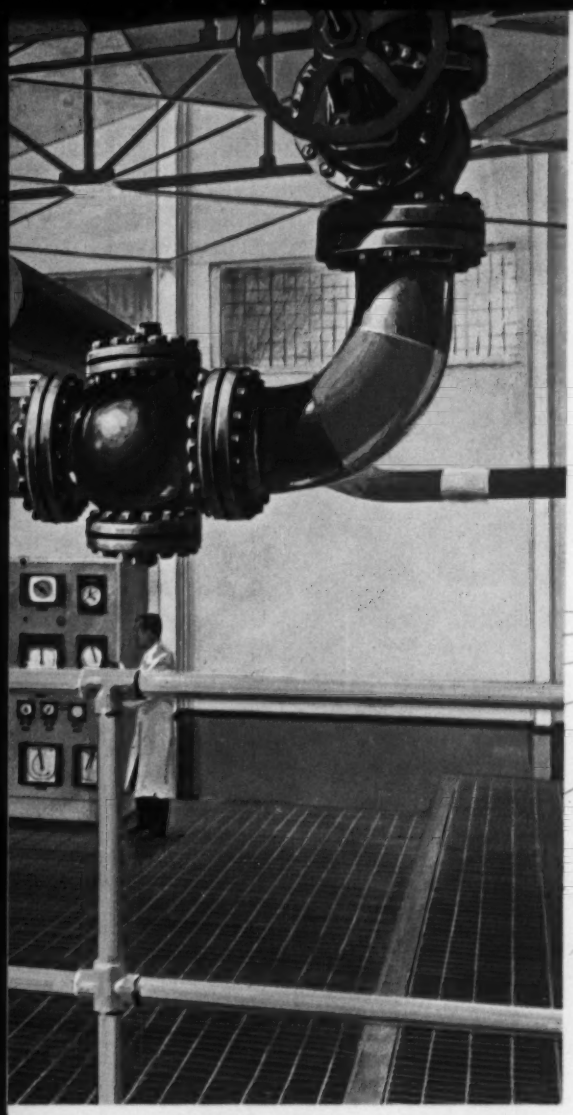

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NEW COLOR HORIZONS

System

HERE is a modern, functional *system* that combines four important points. (1) the ability to stop rust, (2) modern color harmony, (3) durability to last and last, (4) ease of application. From machinery, equipment, and structural steel to tanks, steel fences and metal sash – the Rust-Oleum New Color Horizons System can provide lasting beauty in the colors of your choice. Ask your Rust-Oleum Industrial Distributor, together with your Rust-Oleum Factory Specialist, to make a survey of your plant and provide complete recommendations. Rust-Oleum Industrial Distributors maintain complete stocks for prompt delivery in all principal cities of the United States, Canada, and in many countries around the world.

Rust-Oleum, in its various forms, can also save you time and money on problems like these: Heat Resistance, Water Resistance, Chemical Resistance, Coating Galvanized Metal, Speedy-Dry Coatings (less than thirty minutes to dry).

PROVED THROUGHOUT INDUSTRY FOR OVER THIRTY-FIVE YEARS

RUST-OLEUM®

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STOP RUST by applying Rust-Oleum 769 Damp-Proof Red Primer directly over the sound rusted surface

Save time, money, and metal. Brush Rust-Oleum 769 Damp-Proof Red Primer right over the remaining sound rusted surface after scraping and wirebrushing to remove rust scale and loose rust. **Specially-processed** fish oil vehicle penetrates rust to bare metal as proved in radioactive tracing studies.

STOPS RUST!®

Distinctive as your own fingerprint. There are imitations, but only one Rust-Oleum.

Insist upon industry-proved Rust-Oleum. Accept no substitute.

You take the brush! Try a free test sample!

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- ☐ New full-color catalog on New Color Horizons System and specialized Rust-Oleum systems, including color charts and applications.
- ☐ FREE TEST SAMPLE of Rust-Oleum 769 Damp-Proof Red Primer.
- ☐ Please have your representative contact us to discuss a plant survey.

AUTOMATIC, PRECISION DRILLING

EVERY TIME

...new Gardner-Denver "Tru-Feed"® drills

Rugged, air-powered Gardner-Denver "Tru-Feed" drilling units drill holes up to 1½" in diameter even in hardest metals. Positive mechanical feed assures clean, accurate holes. Precise control of entire operating cycle, and full-power operation at any speed, give smooth, fast performance. Drill's adjustable, rapid advance and sensitive thrust-control features are big cost-savers in production drilling. Available in either portable or stationary models.

Automatic operation—Just push a button to start cycle. When hole is drilled, tool retracts and automatically shuts off.

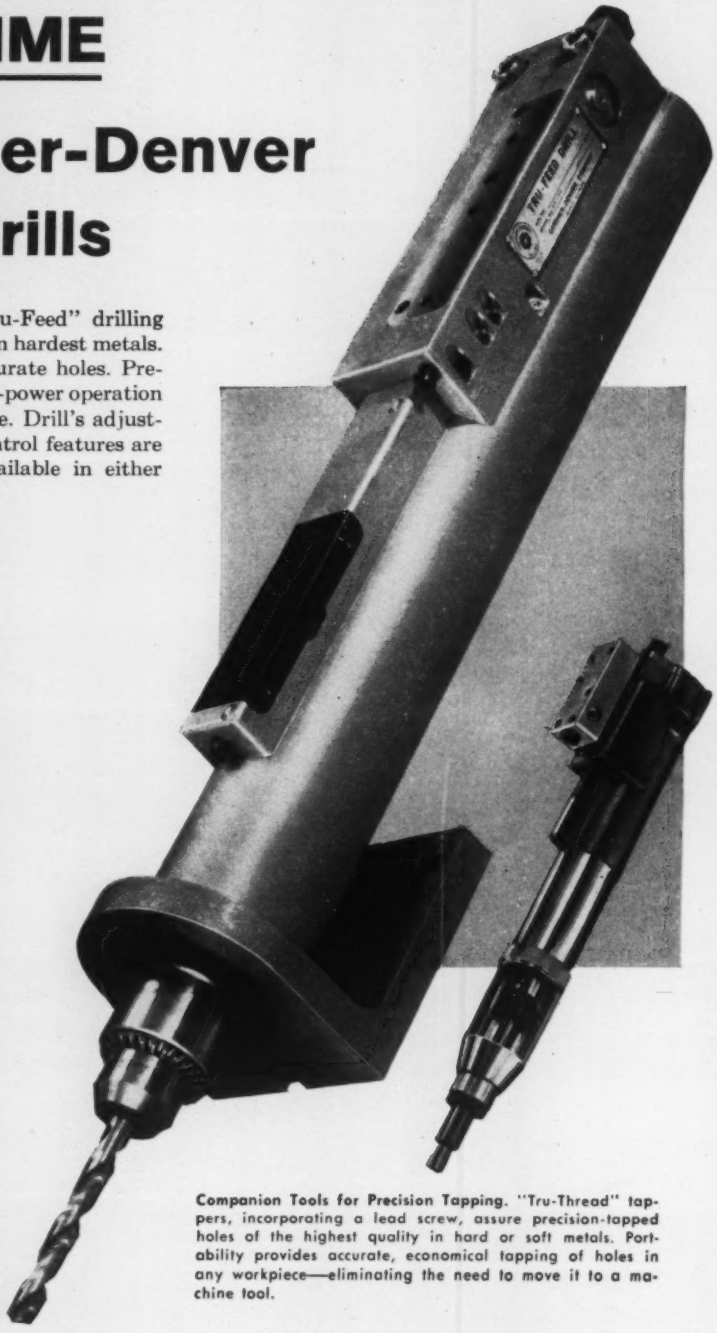
Adjustable stroke—Set two stops to utilize any portion of stroke. Front stop controls hole depth to within .005".

Portable or stationary—For stationary applications, use mounting brackets or drill bushing tips. In portable use, a simple drill bushing fixture lets you move drill from hole to hole. "Tru-Thread"® tapper used in same tooling maintains concentricity between drilled hole and tap.

Adaptable to Automation—Start and stop poppets may be replaced with adapters for remote operation. Pressure-type poppets may be used. A pressure signal is built-in to control sequence of indexing and clamping fixtures.

Powerful and versatile—Compact, heavy-duty air motors develop up to 1½ hp.—provide dependable power for hard-metal drilling, gun-drilling, reaming, boring, counterboring, countersinking and other production operations at speeds from 75 to 4400 rpm, and feeds from .0005" to .0145" per revolution.

For details, request bulletins 93 and 96 on Gardner-Denver automatic drilling and tapping equipment.



Companion Tools for Precision Tapping. "Tru-Thread" tappers, incorporating a lead screw, assure precision-tapped holes of the highest quality in hard or soft metals. Portability provides accurate, economical tapping of holes in any workpiece—eliminating the need to move it to a machine tool.

EQUIPMENT TODAY FOR THE CHALLENGE OF TOMORROW

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Gardner-Denver Company, Quincy, Illinois—Offices in principal U.S., Canadian and Mexican cities
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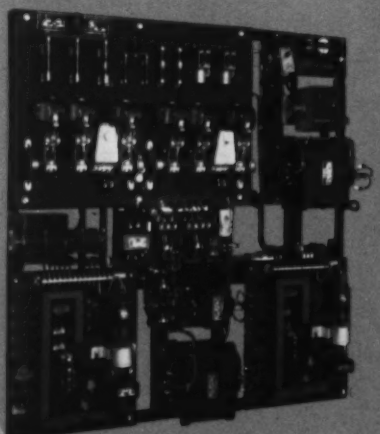
Photo courtesy Inland Steel Company, Chicago, Illinois

FOR EVERY APPLICATION, THERE'S ONE CRANE OUTSTANDING . . . P&H!

In steel mill warehousing, thanks to P&H Electronic Stepless Control, this crane moves heavy loads at high speeds, yet spots them with damage-free gentleness.

The crane is equipped with special tandem hooks — as well as other interchangeable handling equipment — and a clear-vision cab to increase the efficiency of handling steel in and out of convenient top-loading storage racks.

All these useful advantages are the result of P&H experience in crane application engineering. Call in your local P&H crane salesman to help analyze your requirements *before* you draw up your next crane specification. Then send your inquiry where most buyers do: to Harnischfeger, world's largest builder of overhead cranes.



Heart of the P&H Electronic Stepless Control is this a-c electronic control panel. With this control on a three-motor crane, as many as 244 conventional electrical parts are eliminated! Remember, Harnischfeger pioneered this modern concept of crane control . . . over 1000 successful installations to date . . . more than all other manufacturers combined!

Offices in major cities . . . see Yellow Pages

HARNISCHFEGER
Milwaukee 46, Wisconsin

P&H
OVERHEAD CRANES

Photo courtesy United Air Lines, Chicago, Illinois.

WORLD'S LARGEST JET FLEET SERVED BY P&H ZIP-LIFTS

Yes — jet engine parts move through the air with the greatest of care at 2 miles per hour, or less, at United Airlines new jet maintenance center . . . and they do it on P&H Zip-Lift hoists.

Precise, safe handling of expensive precision parts is a "must" with today's aircraft overhaul procedures. This is the reason why so many of today's new aircraft service facilities are equipped with P&H Zip-Lifts. Only P&H Zip-Lift combines feather-touch control with high-speed lifting — and then tops it off with "double-safe" design. For example, Zip-Lifts have two brakes, and either one holds a capacity load—even if the power fails.

There's no reason why you can't have this same kind of performance in your plant on all your lifting jobs . . . especially since Zip-Lift quality is priced surprisingly low! Check this out today with your local P&H distributor . . . or send for Bulletin H-20 to Dept. 231, Harnischfeger Corporation, Milwaukee 46, Wisconsin.

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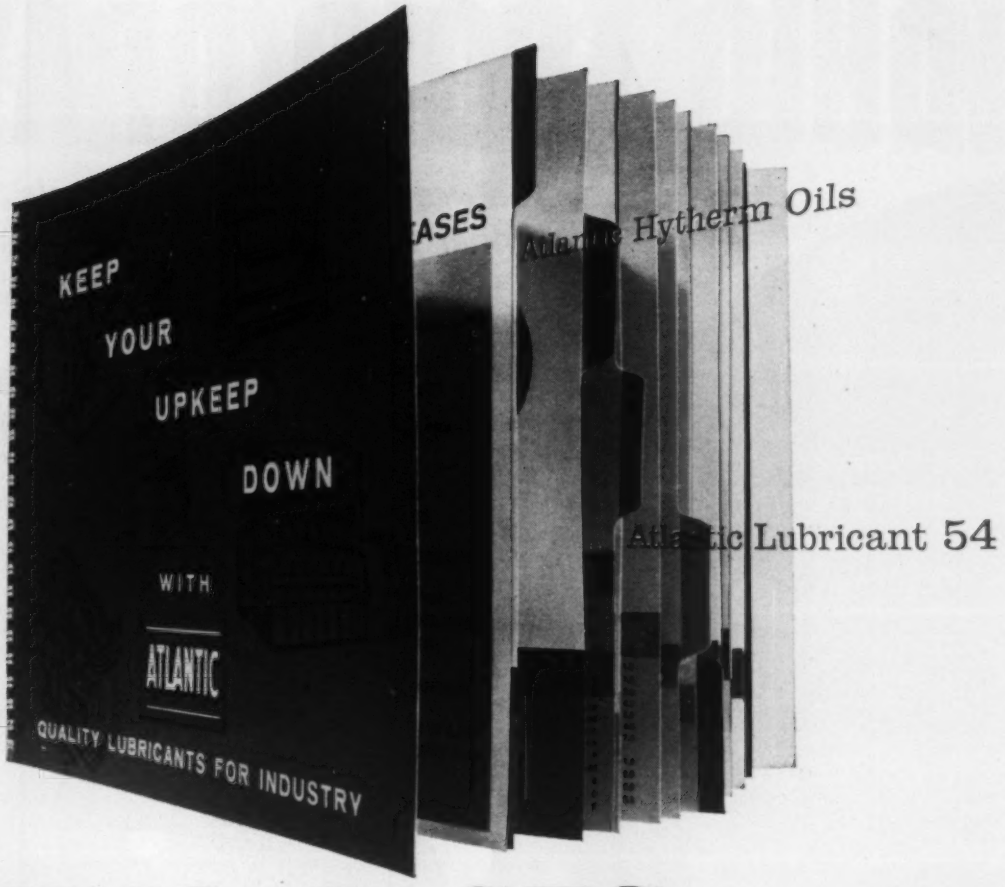
P&H

ZIP-LIFT HOISTS

See your Yellow Pages under "Hoists"



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These pages outline the properties and applications of Atlantic Hytherm Oils and Atlantic Lubricant 54 . . . two products designed to fill 80% of your plant lubricating needs. For your more specialized requirements, you can choose from a long list of quality Atlantic oils and greases. Result: *simpler purchases, use and storage.*

ATLANTIC HYTHERM OILS reduce wear, have good water separating properties, high flash point, low pour point and high Viscosity Index. ATLANTIC LUBRICANT 54 offers excellent water repellency combined with outstanding anti-rust properties. It is particularly effective where moisture conditions require extra protection against rusting and lubricant washout. An experienced Atlantic Sales Engineer will be happy to show you how these versatile, hard-working lubricants can fit into your plant operations.

The valuable 60-page booklet shown above is *free* to lubrication engineers and purchasing agents. It puts complete information on all Atlantic greases and oils at your finger tips. For your copy, simply write The Atlantic Refining Company, 260 South Broad Street, Philadelphia 1, Pa., giving your title and company name. We'll see that a booklet reaches you without delay.

ATLANTIC

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Custom Quality

OHIO COLD DRAWN

features improved physicals, closer tolerances, better finish

Arrows indicate approximate center of weld line. After normalizing, cold drawing and annealing, the weld area cannot be detected even when the polished and acid-etched surface is magnified 100 diameters. This perfect microstructure makes Ohio Drawn-Welded, in every sense, weldless — an ideal tubing for critical mechanical and pressure applications. In addition to cold drawing, a severe test in itself, non-destructive tests such as air, water, magnetic and eddy current, insure 100% acceptability.

A-4363A

WELDED STEEL TUBING

Now Available in Larger Sizes... Heavier Wall Thicknesses

NEWS ITEM:

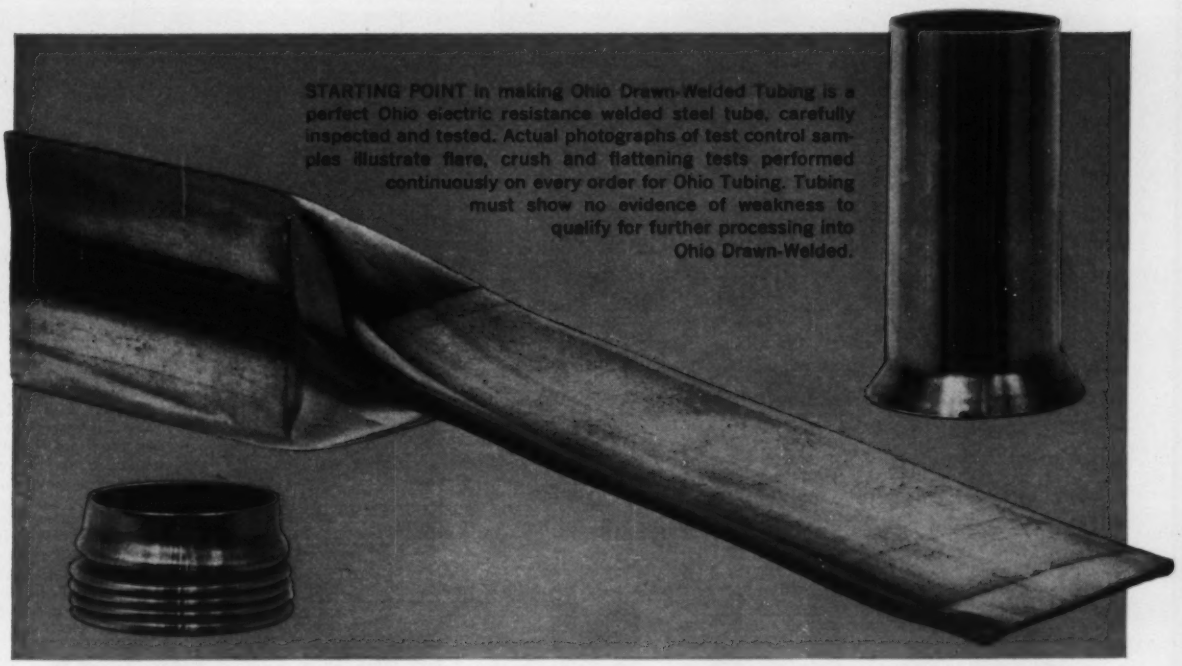
Ohio Seamless is now cold drawing quality electric resistance welded steel tubing up to 7¼ inches with wall thicknesses to .344. Ohio Custom Made Drawn-Welded Tubing is here now — in greater range of sizes, wall thicknesses, finishes than ever before.

TECHNICAL ITEM:

Controlled normalizing assures desired microstructure . . . Precision cold drawing imparts special physical properties, assures uniform wall thickness, delivers closer dimensional tolerances and superior surface finish.

ACTION ITEM:

This all adds up to a new major-source capability that can help you design with new freedom, manufacture at lower costs. Mark your orders: Ohio Custom Made Tubing. Either welded or seamless, it's your best buy whenever tubing is the best shape.


STARTING POINT in making Ohio Drawn-Welded Tubing is a perfect Ohio electric resistance welded steel tube, carefully inspected and tested. Actual photographs of test control samples illustrate flare, crush and flattening tests performed continuously on every order for Ohio Tubing. Tubing must show no evidence of weakness to qualify for further processing into Ohio Drawn-Welded.

OHIO

OHIO SEAMLESS TUBE

Division of Copperweld Steel Company • **SHELBY, OHIO**

Seamless and Electric Resistance Welded Steel Tubing • Fabricating and Forging

Representatives in principal cities. Check leading directories:
THOMAS', MacRAE'S, CONOVER-MAST, SWEET'S, FRASER'S.

See us at the* DESIGN ENGINEERING SHOW *— Cobo Hall, Detroit — May 22-25

PQA

proves it...

breaking point tests show Allen screws are consistently better

***PRODUCT QUALITY ASSURANCE**

PQA is the symbol of unquestioned quality at Allen. It stands for constant quality control from rigid upgrading of incoming raw materials to final, *unconditionally guaranteed* shipment to you.

To give you some idea: Federal Spec. FF-S-86a calls for 4,950 lbs. for the ¼-20 cap screw. Day-in, day-out breaking point tests of these screws prove that Allens are *consistently* better . . . well above the minimum requirement!

Quality checks like this one confirm PQA every step of the way through Allen's manufacturing process. And to help you keep costs down and profit margins up, Allen manufactures 1457 standard sizes.

Remember . . . it costs you no more to have *genuine* Allens right from stock, and they are only a minor fraction of your assembly costs.

ALLEN

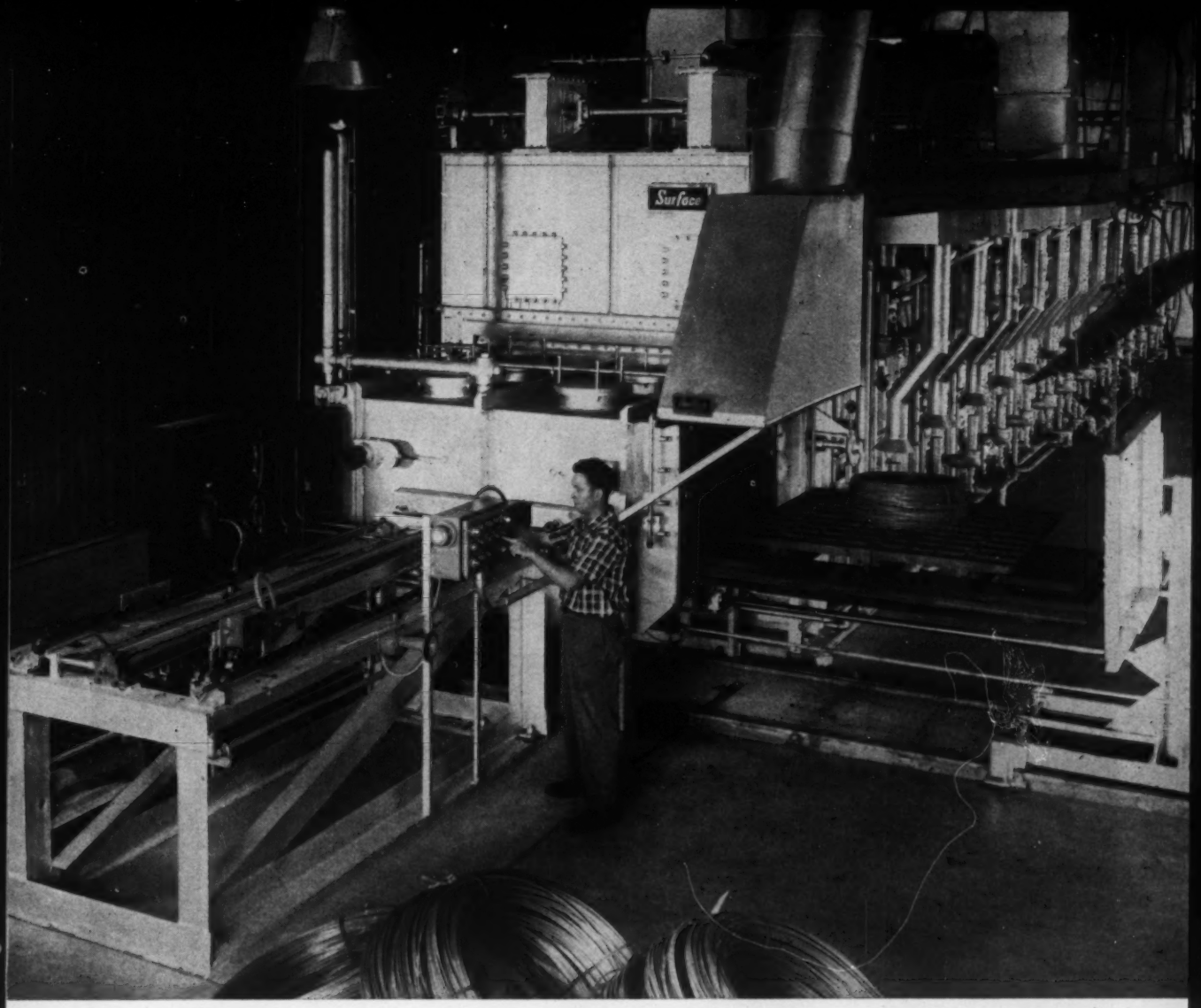
MANUFACTURING COMPANY

HARTFORD 1, CONNECTICUT, U.S.A.

Plant at Bloomfield, Connecticut • Warehouses in Chicago, Cleveland and Los Angeles

Genuine ALLEN products are available only through your ALLEN Distributor. He maintains complete stocks close by to help cut your freight costs, inventory, warehousing and handling. He offers fast, single-source service. He knows Allen products. And he makes Allen Engineering Service available to you any time. Call him!

ALLEN HEAD
HEX-SOCKET SCREWS



Wire inventories reduced by 80% and delivery time cut from months to days

That's the report of the Butcher and Hart Manufacturing Company of Altoona, Pennsylvania. Manufacturers of wire fasteners, Butcher and Hart installed a wire drawing line and a Surface continuous annealing furnace so they could fabricate their own wire and insure its workability for drawing and cold heading operations.

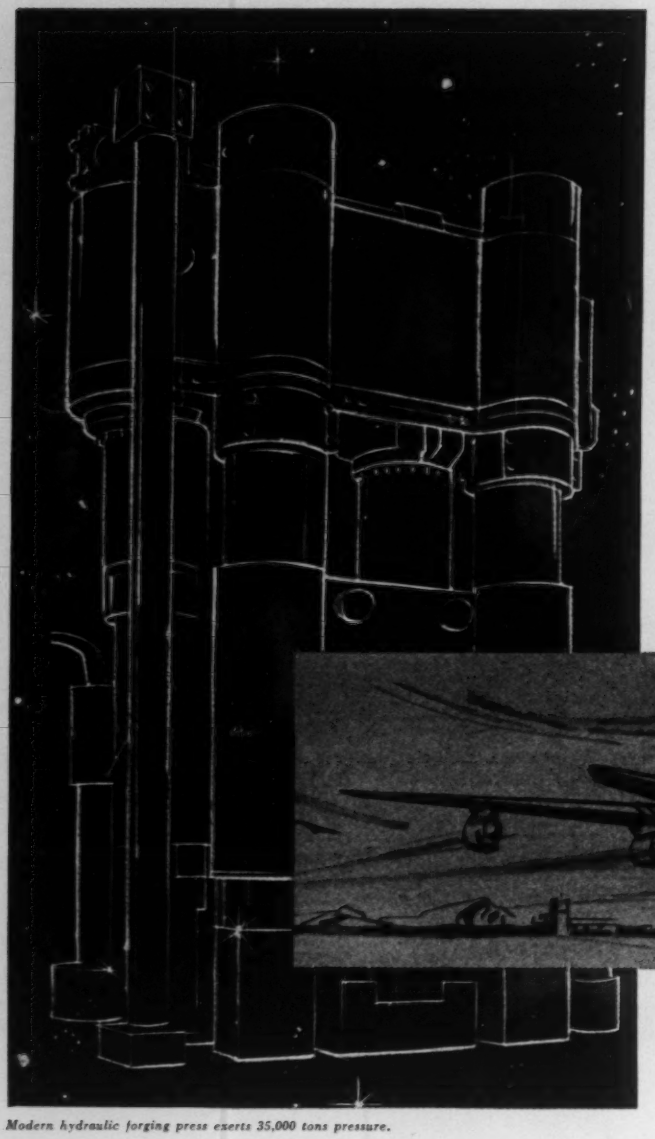
The 100 foot furnace is used to spheroidize the wire between drawings and control carbon for subsequent operations. Only two men operate the entire drawing and annealing line. The consistent and accurate system is composed of the air tight furnace, economical gas generation, and automatic control of carbon content.

The continuous line furnace has carburizing, carbonitriding, skin recovery, annealing, and spheroidizing capabilities.

Write for information: 2385 Dorr St., Toledo 1, Ohio. In Canada: 2490 Bloor St., West, Toronto.

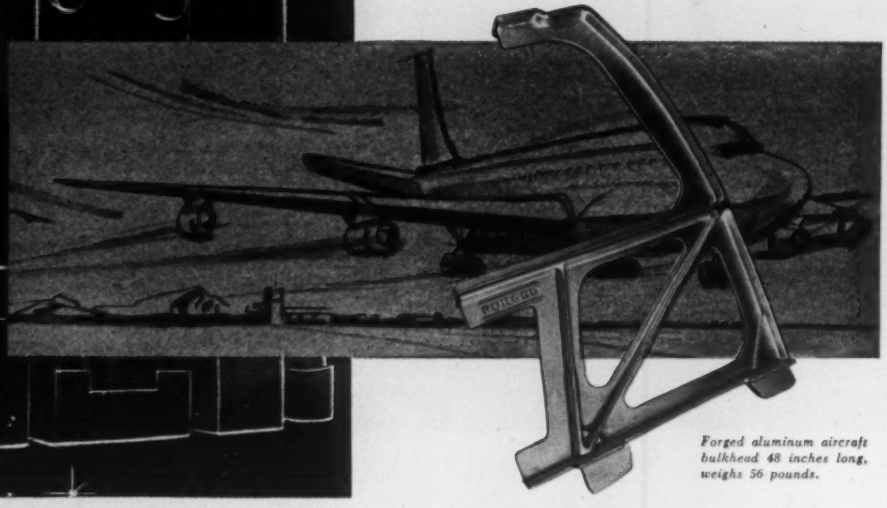
SURFACE

SURFACE COMBUSTION, Toledo 1, Ohio/ a division of Midland-Ross Corporation MR



Modern hydraulic forging press exerts 35,000 tons pressure.

HOW FORGED PARTS help airplanes haul bigger payloads



Forged aluminum aircraft bulkhead 48 inches long, weighs 56 pounds.

SEE THE STORY OF FORGING RELIABILITY
BOOTH 204
DESIGN ENGINEERING SHOW
DETROIT, MAY 22-25

In an airliner, every pound of weight saved is worth hundreds of dollars ... in revenue-making payload. And in military aircraft, pounds saved mean added miles-per-hour ... or added load carried.

In commercial products ... trucks, cars, materials-handling equipment ... the pounds of dead weight you eliminate by using forgings make money year-after-year for the operator. The forging process lets you put the metal exactly where you need it to carry the load, withstand shock or vibration, endure torsion. And with not a surplus ounce of non-working weight going along just for the ride.

Forged parts are the designer's friend ... strong where strength is needed, lowest in weight, twice-worked by original rolling of the best metals *plus* the hammer blows or high pressures of the forging process.

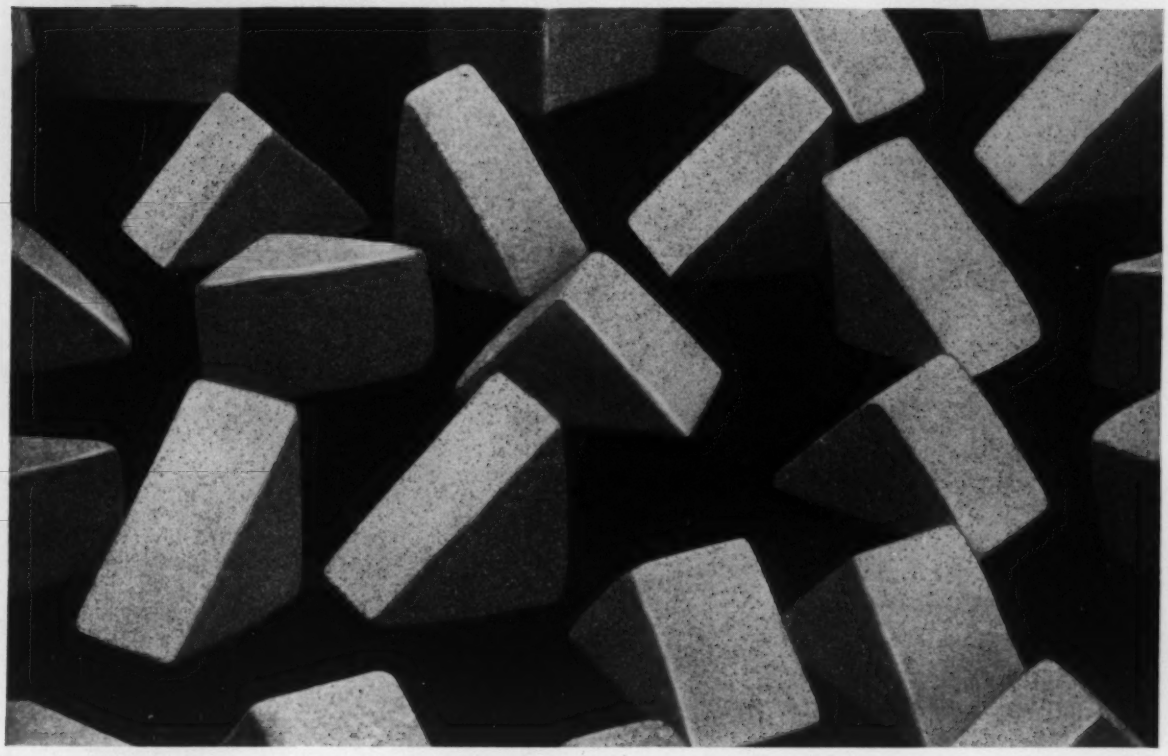
Write for literature to help you specify, design, and procure forged parts.

When it's a vital part, design it to be FORGED

Drop Forging Association • Cleveland 13, Ohio

Names of sponsoring companies on request to this magazine

"CERAMIHONES"



A remarkable new barrel finishing shape specially developed for vibratory equipment

Now "HONITE" BRAND "Ceramihones" barrel finishing shapes let you take advantage of the fast cutting action of vibratory equipment without being penalized by rapid media breakdown and wear. They are also equally effective when used with conventional rotating finishing equipment. "Ceramihones" finishing shapes are fast-cutting, fracture resistant ceramic ideally suited for use on moderately hard and very hard metals. This newest media development from 3M is available in three sizes in a triangular shape to keep lodging problems at a minimum. Order a supply from your distributor of "HONITE" products.

GET COMPLETE SERVICE on all your barrel finishing needs from one dependable source. 3M brings you the most advanced machines, media and methods and backs them with complete laboratory and technical service. For information or sample processing of your materials, contact your distributor of "HONITE" products or write: 3M Co., Barrel Finishing Dept., HAF-51, 900 Bush Ave., St. Paul 6, Minn.

Honite BRAND

EQUIPMENT
MEDIA
COMPOUNDS
FOR BARREL FINISHING

MINNESOTA MINING AND MANUFACTURING COMPANY
...WHERE RESEARCH IS THE KEY TO TOMORROW

3M COMPANY

"HONITE" AND "CERAMIHONES" ARE TRADEMARKS OF 3M CO., ST. PAUL 6, MINN.

Advertisement by American Hot Dip Galvanizers Association

$10,000. in Awards for Hot Dip Galvanizing Ideas

Ten awards offered by American Hot Dip Galvanizers Association in cooperation with American Zinc Institute

Galvanizers International Award

THINK! Think about new uses for Hot Dip Galvanizing! Or, improvements in present uses! Or, new methods of after treatment! If your idea is accepted, you will receive one of ten awards of $1000 in cash, plus a handsome medal, plus an engrossed Certificate of Achievement.

Not a contest but a search for new ideas

This is not a contest—it is a search for new ideas. Your entry will not be judged against others, but solely on its merit and value in developing new applications and markets for Hot Dip Galvanizing. If your idea, in the opinion of the judges, is of practical value to the industry, you will be cited for an award—promptly.

The Hot Dip Galvanizing Industry is anxious to receive ideas of this type; therefore, the judges reserve the right to present *more than 10 awards,* if the entries warrant.

These well-known men will act as judges

Dr. Clarence H. Lorig, Technical Director, Battelle Memorial Institute and Past President American Society for Metals. Mr. John R. Daesen, Technical Director, American Hot Dip Galvanizers Association. Mr. John L. Kimberley, Executive Vice President, American Zinc Institute.

Anyone is eligible to enter

Anyone in the world (except members of the American Hot Dip Galvanizers Association and the American Zinc Institute, and their employees and advertising agencies) may submit one or more entries.

Business firms or corporations may submit entries under their business name, instead of as individuals, if they choose.

Entries will be considered by the judges promptly upon their receipt. No entry received after April 30, 1962 will be considered.

These are the kind of ideas we're looking for:

The Awards will be made for ideas pertaining to: (a) Applications of Hot Dip Galvanizing to a new or unusual field, or; (b) An improvement in application in fields where Hot Dip Galvanizing is now being used, or; (c) New methods of after-treatment of Hot Dip Galvanized products.

Each entry must contain:

(a) Description and documentation of application.

(b) Case history of the application or process accompanied by photo, drawings, formulae, etc.

(c) All technical data needed for the utilization of the idea submitted.

(d) Release of the application or idea for general use without payment or royalty other than the $1000 award.

Other conditions:

The decision of the judges will be final.

Award-winning ideas will be retained by the American Hot Dip Galvanizers Association for dissemination throughout industry. Other entries will be returned.

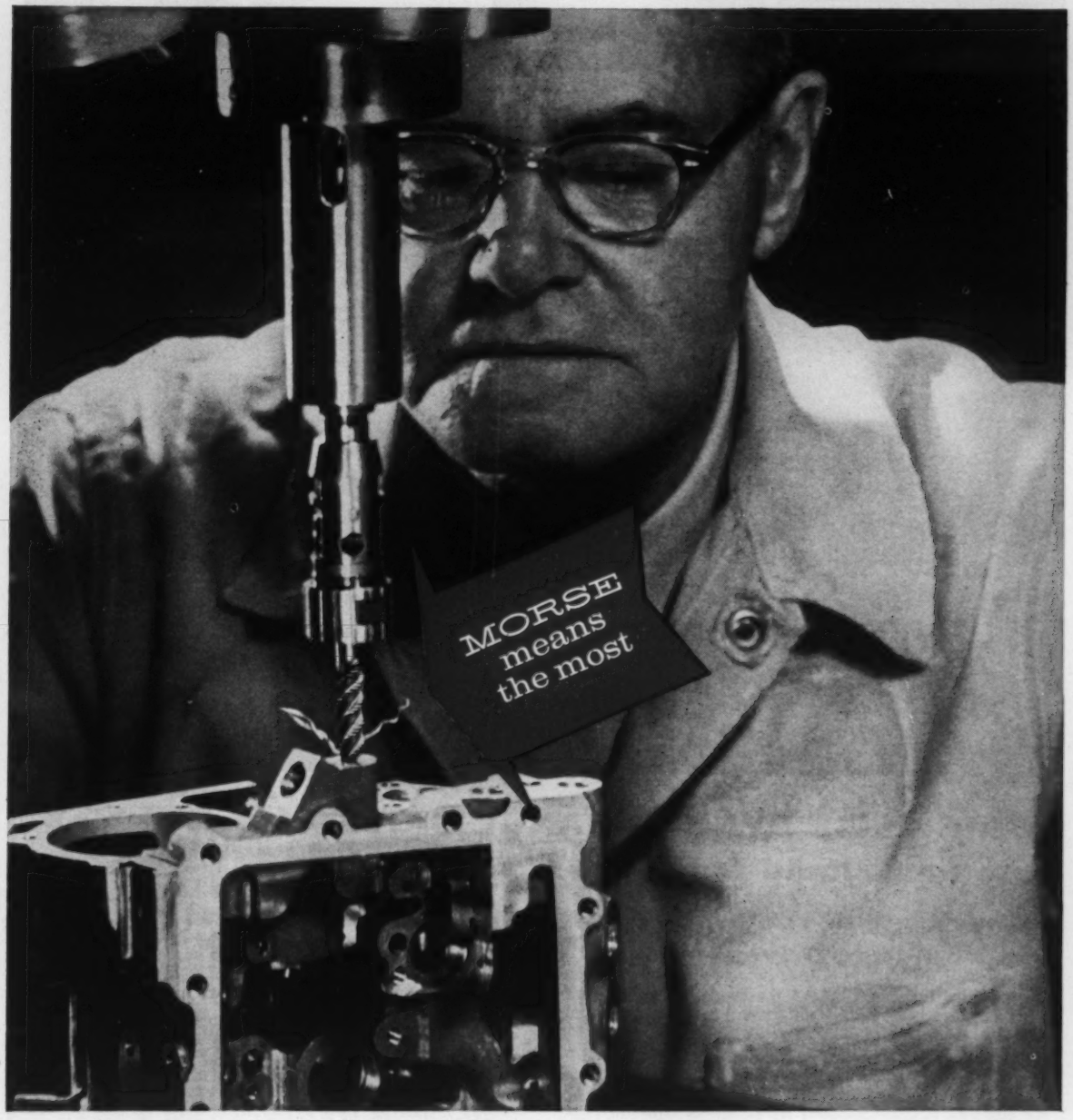
No formal entry blank is required. The entry should be accompanied by your name, address and business connection.

Entries should be sent to:

American Hot Dip Galvanizers Association, Inc.
5225 Manning Place, N. W.,
Washington 16, D. C.

Note: For information on galvanizing, write to the above address for name and location of the American Hot Dip Galvanizers Association member nearest you.

with men who know cutting tools... it's MORSE everytime



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SEE YOUR NEARBY MORSE DISTRIBUTOR

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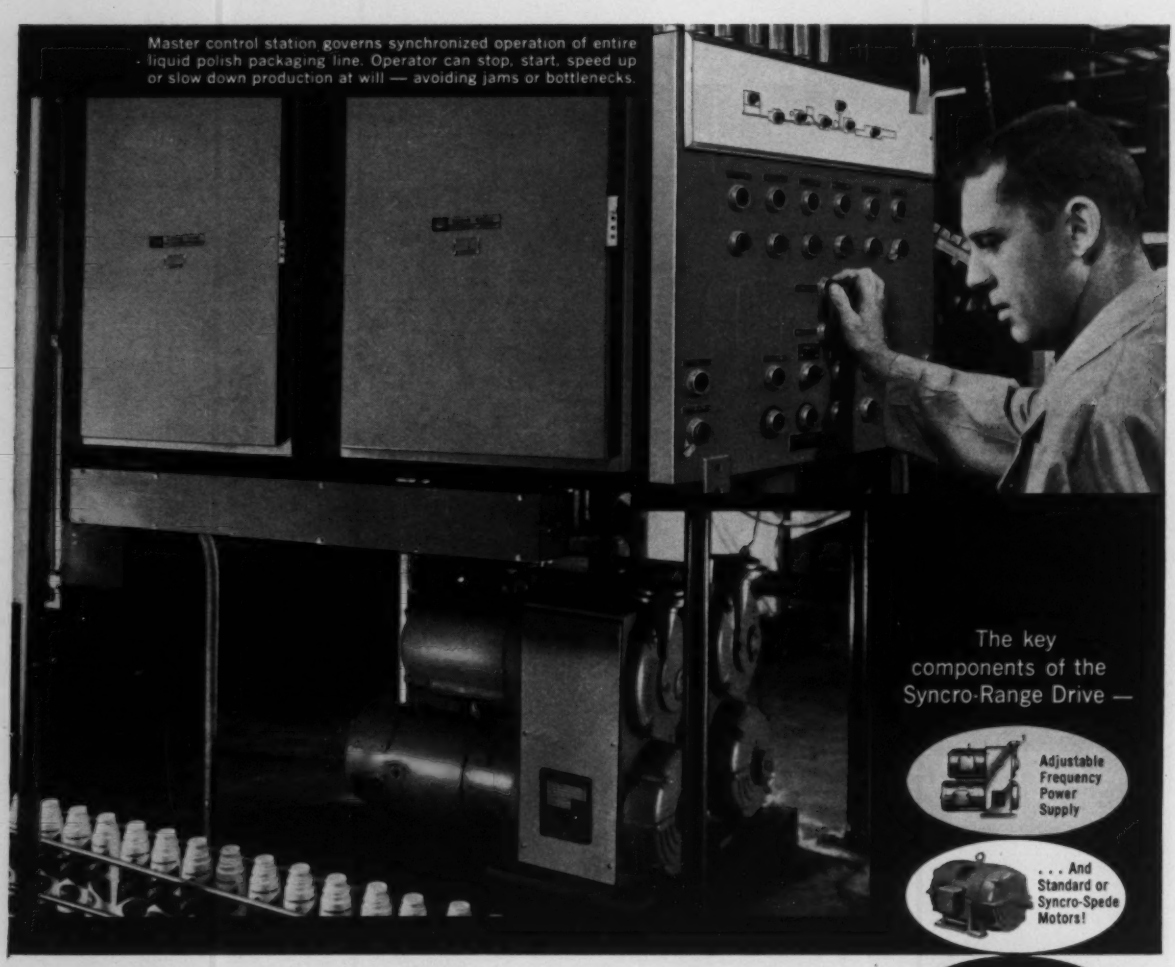
WAREHOUSES IN: NEW YORK • CHICAGO • DETROIT • DALLAS • SAN FRANCISCO


Master control station governs synchronized operation of entire liquid polish packaging line. Operator can stop, start, speed up or slow down production at will — avoiding jams or bottlenecks.
The key components of the Syncro-Range Drive —
Adjustable Frequency Power Supply
. . . And Standard or Syncro-Spede Motors!

LOUIS ALLIS SYNCRO-RANGE DRIVES automate liquid polish lines

Johnson's Wax, renowned wax and polish producer, uses Syncro-Range Drives for exact control of process lines

Controlling the speed of the precise, mass-production lines for their new, highly successful liquid shoe polish was the task Louis Allis engineers had to solve for Johnson's Wax.

The problem was to time the flow of plastic bottles, liquid polish, wool daubers, and caps into the packaging lines at precisely equal rates. Flow rate must be adjustable so the lines can be slowed down or speeded up. And the entire packaging operation must be controllable from a single master control. The Louis Allis Syncro-Range Drive solved the problem.

Syncro-Range Drive provides synchronized speed of any number of motors from a single control. It is a "packaged system" comprising an adjustable frequency power supply operating on 3 phase, 60 cycle power input . . . a group of Syncro-Spede® synchronous motors which maintain exact synchronism regardless of varying load . . . and a control which permits the speed of the entire group of motors to be simply adjusted without losing synchronization. On applications for which exact synchronism is not required, standard squirrel cage motors can be supplied.

You can readily see the advantages of the Syncro-Range Drive in systems or processes which require synchronized movement: multiple conveyors which feed consecutively; transfer lines; process lines; assembly lines requiring coordinated arrival of components; printing where one press feeds another; synthetic fibre spinning, drawing, or twisting; metal runout tables; and other similar machines which require the application of power at a number of points on the machine.

The Syncro-Range Drive is available with a choice of drive sizes to efficiently control from 2 to 200 motors. Control features are available to provide speed regulation accurate to 0.1% with 0% relative speed difference between motors! A trained Louis Allis motor application engineer is available to help. You can reach him at your local Louis Allis District Office, or by writing to The Louis Allis Company, 471 East Stewart Street, Milwaukee 1, Wisconsin.

ASD-232

LOUIS ALLIS

MANUFACTURER OF ELECTRIC MOTORS AND ADJUSTABLE SPEED DRIVES

TENZALOY

Tenzaloy Aluminum for high-strength castings without heat treatment

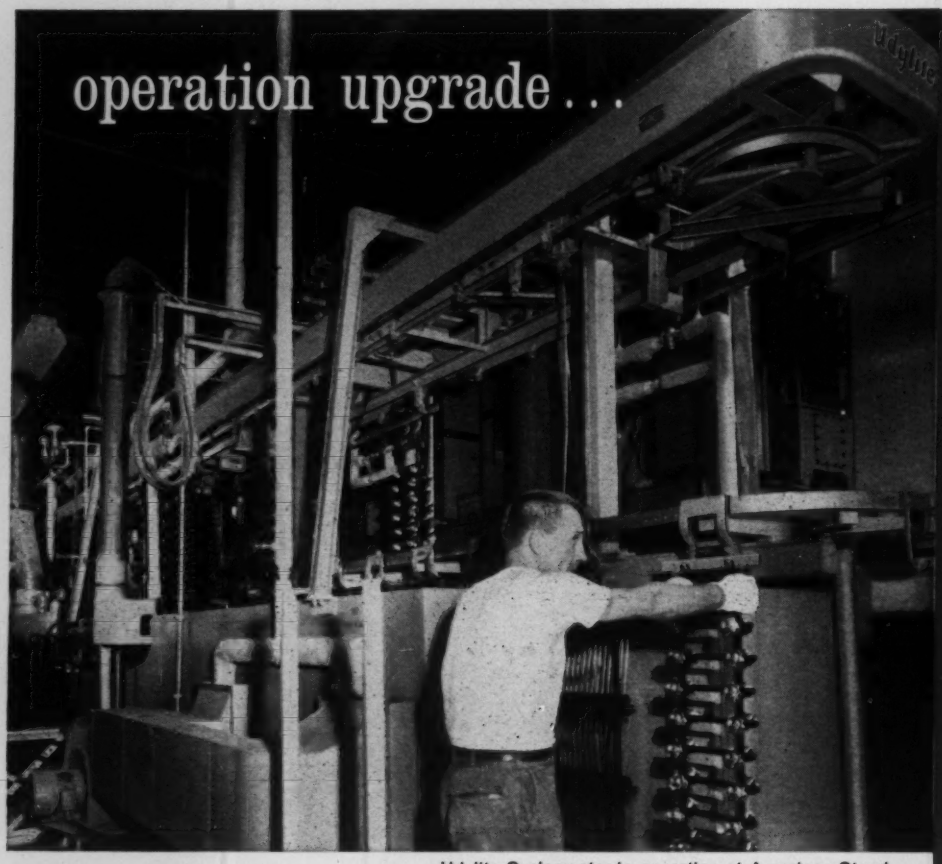
When you need a high-strength aluminum casting your alloy should be self-aging Tenzaloy — particularly if you want to avoid heat treatment. *Tenzaloy has this unique combination of properties:*

1. High yield and tensile strength
2. Exceptional machinability
3. Remarkable dimensional stability
4. High impact and shock resistance
5. Excellent corrosion resistance
6. Permanent, silvery-white finish

Tenzaloy castability is excellent in green sand, plaster, investment, shell, oil-bonded sand and permanent molds of all kinds. It is particularly suited to designs where load-carrying capacity, impact strength and light weight are essential, and it is used in applications where heat treated aluminum alloys, cast iron or other materials might otherwise be selected.

Write for your copy of Bulletin 103R5 to: Federated Metals Division, American Smelting and Refining Company, 120 Broadway, New York 5, N. Y.

ASARCO



Udylite Cyclemaster in operation at American Standard Plumbing and Heating Division, Cincinnati, Ohio

CYCLEMASTER has the answer

This Udylite Cyclemaster, which is another way to say low cost automation, represents six important areas of improvement in American Standard's plating production.

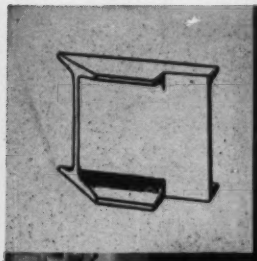
- quality control to meet their most exacting top standards
- production volume far exceeding their expectations
- nearly 50% savings in floor space used for the operation
- almost total elimination of rejected pieces
- ultra-sonic cleaning to eliminate complicated de-greasing
- Plastisol coated tanks for minimum maintenance . . . long life

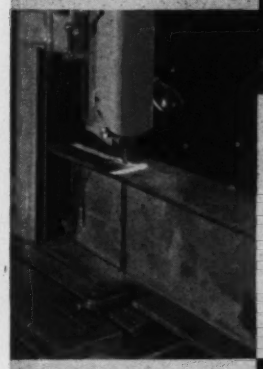
Learn how Cyclemaster can perform with equally promising revisions of your profit picture while improving your product whatever it may be. To find out how so *much* can be accomplished for so *little*, ask your Udylite representative, today!

Udylite

The Udylite Corporation
Detroit 11, Michigan

udylite



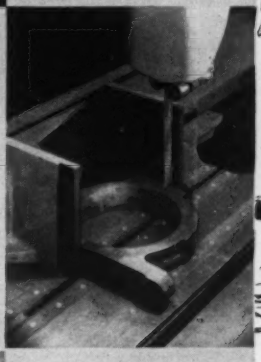


COPING AND MITERING HEAVY STRUCTURAL SHAPE

18" Beam (above) is held between vises for the short cut. On the long cut (left) vises were removed and beam held by simple clamp. The MARVEL Band Saw is truly indispensable in ornamental and structural iron shops where this type of work is done daily. The machine will cut-off square, miter and cope any work shape from the smallest moulding to 18" I-beams.

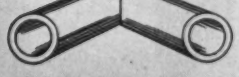
SPLITTING CLAMP RINGS, BUSHINGS

Splitting clamp rings, connecting rods, bushings and collets is a fast, simple operation on the No. 8 Band Saw. Perfect control, quick chucking facilities, accuracy and speed are features that especially fit the machine to handle this type of work.



MITERING LARGE DIAMETER PIPE

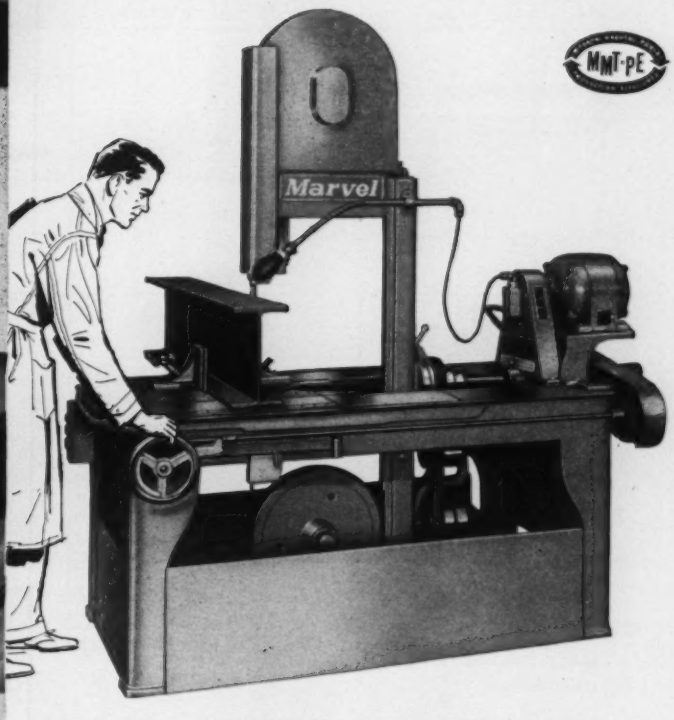
Pipe (or any bar shape) may be mitered at a 45° angle without the need for special jigs or fixtures. Even when cutting miters, work remains in the same position as it does for straight cuts. Column and blade are instantly tilted to desired angle, even without stopping the machine. Perfect miters (or lesser angles) are sawed without any layout or special equipment.



SEGMENTING LARGE DIE BLOCK

Three equally spaced re-entrant cuts were made in this 16" x 18" SAE 4130 Forging. Job was completed, floor-to-floor in 5 hours. No special jigs or fixtures were required. An unusual job that serves to emphasize the versatility of the MARVEL No. 8 Saw.

"The One Machine We Couldn't Do Without"



"As simple to use and handy as a Scout Knife" is the way another user described his MARVEL No. 8 Universal Band Saw recently . . . and we can't think of a better way to describe this versatile metal cutting machine.

With a MARVEL No. 8 Band Saw, you can do almost any conceivable straight, angle, or miter metal sawing job—from cutting-off bar stock to making the most unusual forming cuts. You can handle small, delicate work, and in the next minute, saw structurals, or segment large work as illustrated in the lower photograph. You will save time, labor, and material with a MARVEL No. 8 Band Saw because no other saw has all the features to be had in this truly universal tool.

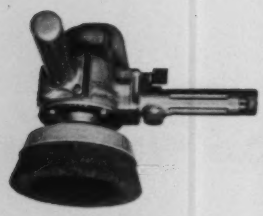
Upright column design and forward travel of the blade through the work (which remains stationary on the table-height saw bed) provides easy, unobstructed visibility and more convenient and efficient working conditions; column can be tilted and locked at any angle up to 45° left and right of vertical; the exclusive MARVEL Power Feed with Automatic Overload Relief; Automatic cutting-depth stops; simple, convenient operating controls—these are some of the features which make the No. 8 Band Saw the most useful—and used—metal cutting saw on the market.

For the complete story, ask or write for Bulletin 875 which illustrates and describes MARVEL Universal Metal Cutting Band Saws.

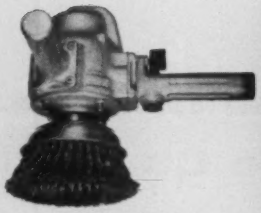
MARVEL *Metal Cutting* **SAWS**
Better Machines—Better Blades

ARMSTRONG-BLUM MFG. CO. 5700 W. Bloomingdale Ave. • Chicago 39, Ill.

pick your production-proved Cleco Air Tool



Vertical Grinders



Vertical Wire Brush Machines

Drills

Screwdrivers

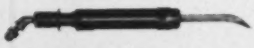
Screwdrivers

Nutrunners

Impact Wrenches

Die Grinders

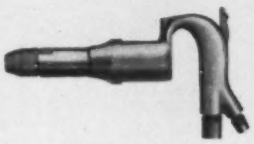
Horizontal Wire Brush Machines



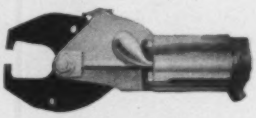
Scalers

Scalers

Chippers



Riveters



Squeeze Riveters

The tools pictured above are only a representation of the hundreds of Cleco Air Tools available.

For detailed information on Cleco's complete line of production-proved air tools and accessories, or for a demonstration-tryout, contact your local Cleco representative or write:

Rammers

Paving Breakers

Clay Diggers

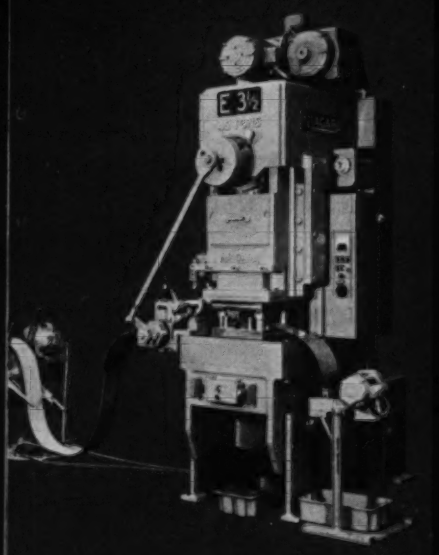
A Division of **Reed Roller Bit Company**
P. O. Box 2541 Houston 1, Texas, U. S. A.

Cleco Pneumatic Tool Company of Canada, Ltd.
927 Millwood Road, Leaside (Toronto), Ontario

"quality tools engineered for industrial progress"

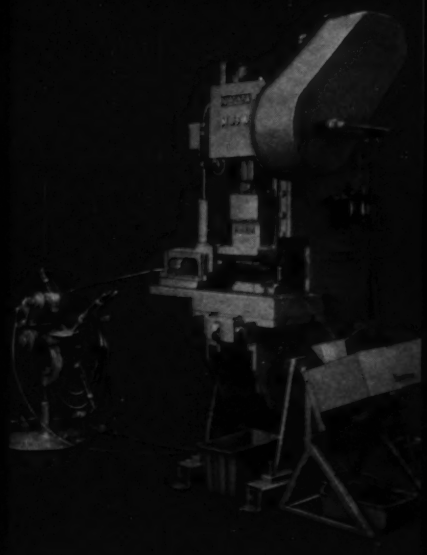
CLECO
AIR TOOLS

PRECISION PARTS BY THE MILLIONS



SERIES E — FRONT-TO-BACK CRANKSHAFT OBI's
Capacities: 45 to 200 tons.
45-ton model (above) stamps out fuse tips at rate of million/day.

SERIES SA-2 STRAIGHTSIDE AUTOMATICS
Capacities: 25 to 300 tons.
100-ton package (above) includes double roll feed, stock reel, scrap cutter.



SERIES M — ULTRA-HIGH SPEED OBI's
Capacities: 22 to 60 tons.
35-ton model shown operates at adjustable speeds up to 1000 spm and produces parts at rate of million/day.

3 great Niagara lines excel in automatic, high speed, progressive die work

Premium construction! It's the key to premium performance here! These modern Niagara presses are designed strictly for automatic, high speed, progressive die work.

Model for model, they'll turn out more parts per hour than conventional presses of equivalent tonnage can even approach. Far heavier and more massive, they have the ruggedness, rigidity, and stamina to run vibration-free at high speeds.

Providing more guiding surface, their gibbing holds slide and bed in precise alignment for precise production, longer periods between die grinds, and longest possible die life.

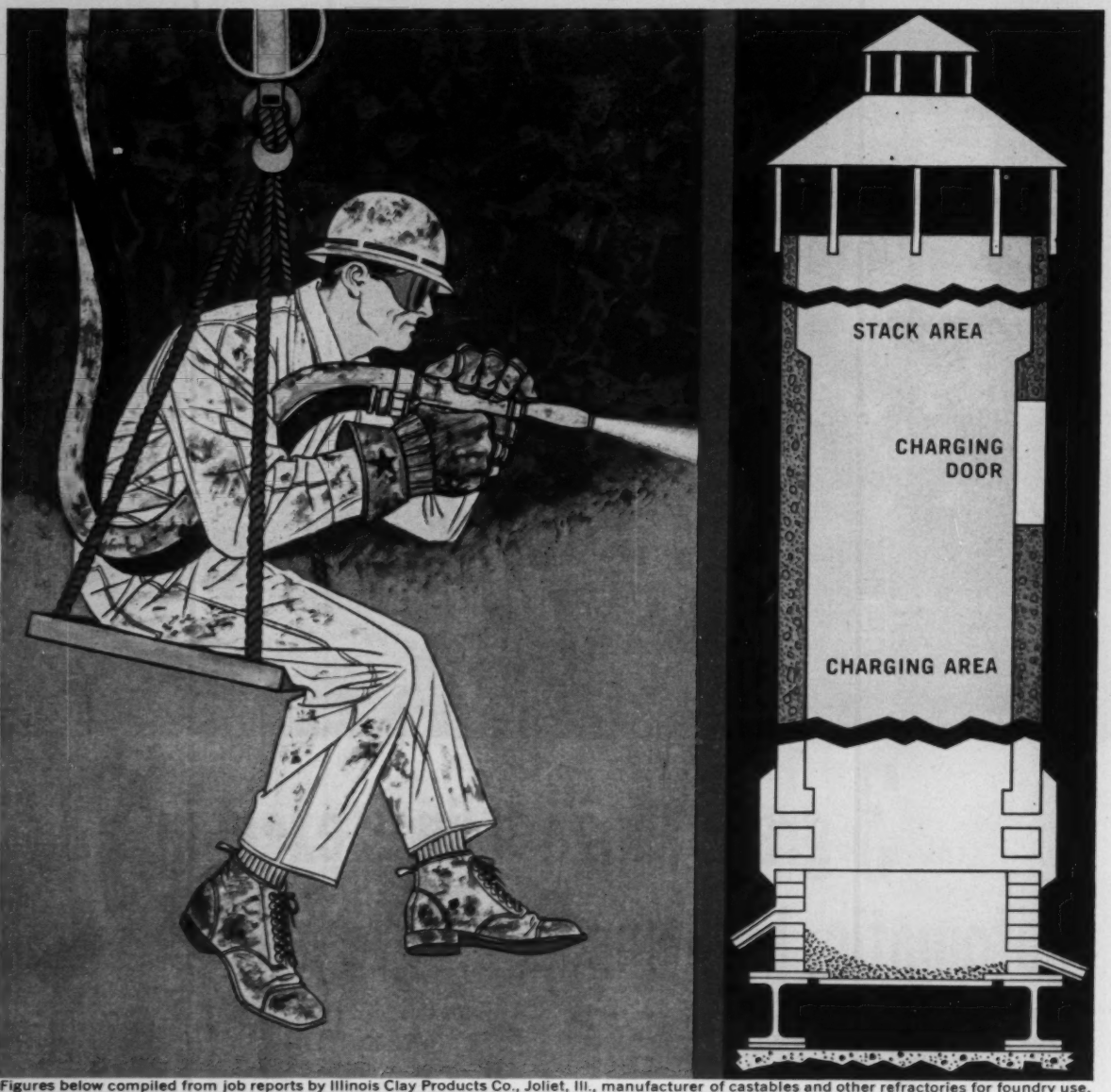
But this just begins to tell the story . . .

YOU'RE INVITED TO CHECK all the features of these production-boosting machines. Illustrated Bulletins 54 (Series M), 56 (Series E), and 264 (Series SA-2), will be mailed on request. Write: Niagara Machine & Tool Works, Buffalo 11, N. Y.

NIAGARA

America's most complete line of presses, press brakes, shears, other machines and tools for plate and sheet metal work.

Line cupolas, by gun, with monolithic refractory castables!



Figures below compiled from job reports by Illinois Clay Products Co., Joliet, Ill., manufacturer of castables and other refractories for foundry use.

Foundries that use castables made with LUMNITE calcium-aluminate cement to line cupolas have cut installation time 75%, reduced refractory costs 43%, and increased lining life 78%.

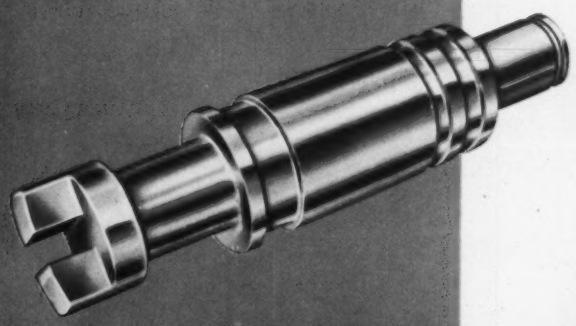
Gun-applied castables in the charging zone and upper stack of cupolas form a strong, joint-free lining that offers greater resistance to erosion. The concrete lining may be gunned to any thickness, actually helps reinforce the shell, reaches full strength in 24 hours.

Castables for cupola linings are available from leading manufacturers of refractories. For details on the use of LUMNITE cement, write Universal Atlas, 100 Park Avenue, New York 17, N. Y.

Universal Atlas Cement Division of United States Steel

"USS" AND "LUMNITE" ARE REGISTERED TRADEMARKS. L-214

OFFICES: Albany • Birmingham • Boston • Chicago • Dayton • Kansas City • Milwaukee • Minneapolis • New York • Philadelphia • Pittsburgh • St. Louis • Waco



There is a "Service Proved" United Roll for Every Mill Installation

UNITED®

44" x 104"
BLOOMING AND SLABBING
MILL

Plants at Pittsburgh, Vandergrift, Youngstown, Canton, Wilmington

SUBSIDIARIES: Adamson United Company, Akron, Ohio; Stedman Foundry and Machine Co., Inc., Aurora, Indiana

Designers and Builders of Ferrous and Nonferrous Rolling Mills, Mill Rolls, Auxiliary Mill and Processing Equipment, Presses and other heavy machinery. Manufacturers of Iron, Nodular Iron and Steel Castings and Weldments.

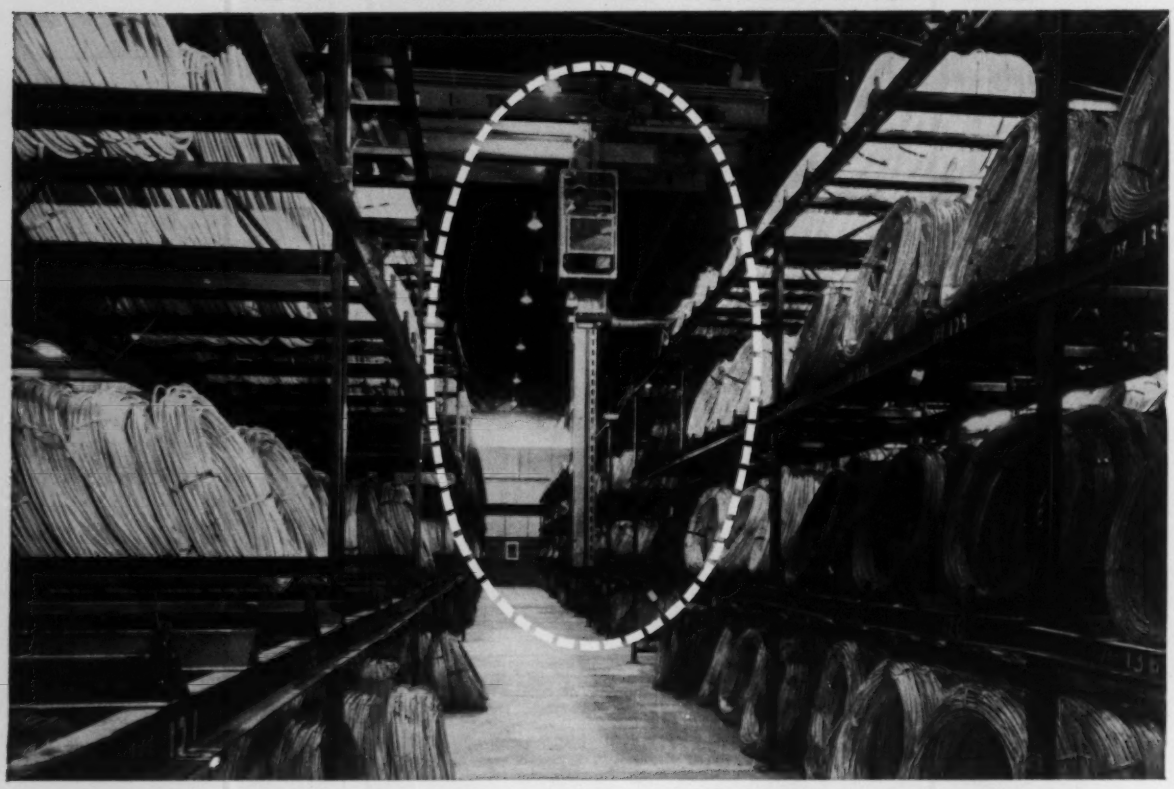
1901 UE&FCO 1961

Progress...Leadership United for Sixty Years

The United combination of 60 years of experience, and a continuing program of metallurgical research, sound engineering and modern production facilities, sets the standard for rolling mills, rolls and auxiliary equipment throughout the world.

UNITED
ENGINEERING AND FOUNDRY COMPANY
PITTSBURGH 22, PENNSYLVANIA

How a TRAK-RAK Crane Can Save You Money BEFORE IT'S INSTALLED....



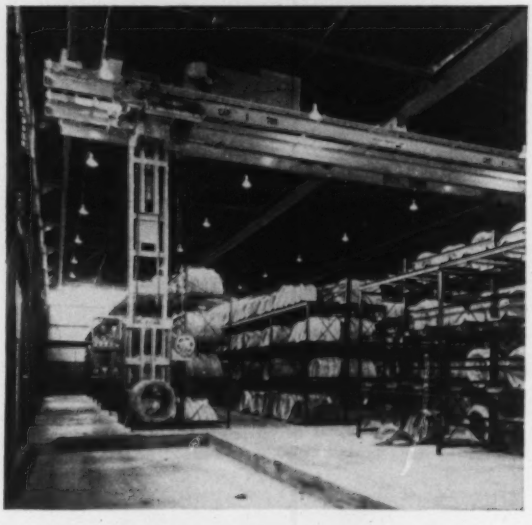
And Pay For Itself in Time and Labor Savings After It Goes to Work!

Considering an addition to your present storage facilities—or planning construction of a new warehouse building? A TRAK-RAK Crane can save you money by permitting a sharp reduction in the overall size of the addition or building . . . and still enable you to store the same volume or tonnage.

Hundreds of installations in warehouses and plants of every type are proof of the speed, efficiency, and economy of the TRAK-RAK System. A recent installation at Chandler Products Corporation, Cleveland, is a case in point.

> In an area of 20,000 sq. ft., 7500 coils (2,500,000 lbs.) are stored four high—using the floor and 3-tiered racks. The TRAK-RAK Crane handles the entire stock, from unloading coils at the rate of 1000 lbs. per minute from trucks, to moving them in and out of storage. Manpower savings of 70% . . . increased handling speed and safety . . . optimum rotation of stock . . . and a considerable reduction in warehousing costs are reported by the Company.

A TRAK-RAK Crane can be installed in your present warehouse area, enabling you to increase storage capacity, speed handling, and reduce costs. *Why not write for details now?*



TRAK-RAK Crane at truck unloading area. Unit unloads 1000 lbs. of coil stock per minute.

CHICAGO TRAMRAIL DIVISION

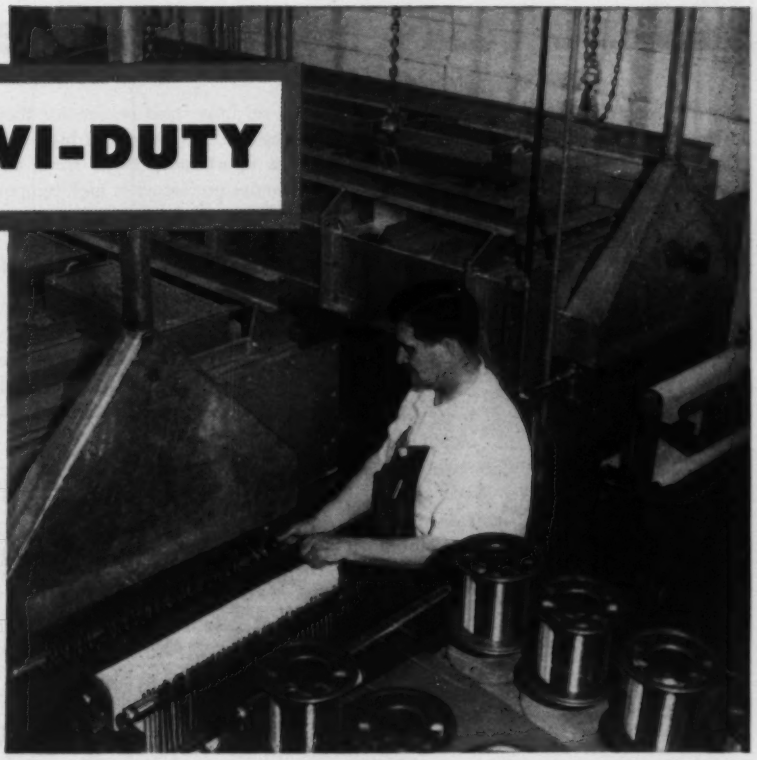
CONCO ENGINEERING WORKS, INC.

1326 SOUTH KOSTNER AVENUE CHICAGO 23, ILLINOIS

Ask HEVI-DUTY

...Appleton Wire Works Corp. did

...and now bright anneals 4 miles of wire every minute at 1500° F. with



Two Hevi-Duty strand annealing furnaces, each with 40 alloy tubes and three zones of temperature control, produce up to 22,000 ft. of quality brass and bronze wire per minute at temperatures to 1500° F. at the Appleton Wire Works Corp., Appleton, Wis. Each electric annealing furnace is used 24 hours per day and five days a week.

2 HEVI-DUTY ELECTRIC FURNACES

At the Appleton Wire Works Corp., Appleton, Wisconsin, two Hevi-Duty electric strand annealing furnaces bright anneal up to 22,000 ft. of brass and bronze wire per minute at temperatures to 1500° F. The wire is used in the weaving of wire cloth for the paper and pulp industry.

Designed for maximum operating temperatures of 2000° F., each Hevi-Duty furnace has 40 alloy tubes through which the wires pass, and three zones of temperature control. Wire is annealed under a dissociated ammonia atmosphere.

These Hevi-Duty furnaces are in operation 120 hours per week, and this company reports significantly low operating costs. Temperature uniformity of ±5° F. along the heated length of all tubes has extended tube life by eliminating hot and cold spots.

Like Appleton Wire Works Corp., you too, can boost production, realize lower operating costs, and obtain temperature uniformity and rapid, easy temperature control with Hevi-Duty furnaces.

On any heat processing problem, contact Hevi-Duty. Call or write today.

HEVI-DUTY

A DIVISION OF BP C BASIC PRODUCTS CORPORATION

ASK HEVI-DUTY
for more information on electric or fuel fired heat treating furnaces. Write for Bulletin 653A for full details.

HEVI-DUTY ELECTRIC COMPANY, MILWAUKEE 1, WISCONSIN

Industrial Furnaces and Ovens, Electric and Fuel • Laboratory Furnaces • Dry Type Transformers • Constant Current Regulators

How to choose a metal for high-temperature service

In every sense, "the heat's on" and "the pressure's on" when metals go to work at high temperatures. The basic trend in processing equipment has been toward higher pressures, higher temperatures, and more corrosive conditions.

That's why questions like these are being asked today: What metal is used within the core of a gas-cooled reactor where operating temperatures go up to 1700°F? What metal is used for the "skin" of a missile that must take supersonic heats from 400° to 600°F . . . and be the structural framework for 130 tons of dead weight? What metal is used to withstand the corrosion of hot ammonia gas at 900°F? What metal is used for strength and corrosion resistance above 1000°F?

The answer, in each case: Nickel Stainless Steel.

Nickel works as a strengthening and toughening agent. In steel it promotes the formation of austenite, which is stronger and more stable at high temperatures than ferrite. Nickel steps up steel's resistance to oxidation, carburizing, nitriding and thermal fatigue.

The war against corrosion. High-temperature equipment is exposed to a great many different atmospheres and corrosive conditions. Many materials coming from high-temperature processing and handling must be delivered uncontaminated by the products of corrosion. Nickel stainless steels are especially good for fighting corrosion . . . perform well under those oxidizing conditions harmful to unalloyed steel. The stainless steels possess the ability to protect themselves with oxide films that form a shield against corrosion. And *stainless* steel, as the name implies, stays brighter, cleaner . . . and the protective "oxide layer" is less likely to be broken or reduced by pitting or scaling.

What strength means at high temperature. By a mechanism known as "creep" metals at elevated temperatures flow plastically though subjected to stresses below their yield strength, as determined by short-time tensile tests. The creep strength of nickel stainless steels is an important reason for their increasing use in a variety of high-temperature operations. Both *time* and *stress* are design factors at high temperatures. The most generally useful data are those for creep and rupture—one or the other is the basis for most allowable stress values in design work.

The chart below gives the creep and rupture strength data of two nickel stainless steels that have found wide acceptance in high-temperature service:

	CREEP STRENGTH			
	1000°F		1500°F	
AISI TYPE	1% 100,000 hrs,psi	1% 10,000 hrs,psi	1% 100,000 hrs,psi	1% 10,000 hrs,psi
310	17,500	32,500	1,250	3,500
316	14,750	24,500	1,800	4,200
	RUPTURE STRENGTH			
	1000°F		1500°F	
AISI TYPE	100,000 hrs,psi	10,000 hrs,psi	100,000 hrs,psi	10,000 hrs,psi
310	21,000	25,000	1,600	2,800
316	--	--	1,600	3,400

Don't stop at creep and rupture strength . . . other critical questions must be considered in the selection of metals for high-temperature service. They include:

- high temperature ductility
- short-time tensile properties to help evaluate resistance to momentary overloads
- thermal shock resistance

Before selecting a metal for a specific service ask yourself these questions:

- ☐ What is the maximum temperature of operation?
- ☐ What kind of temperature cycling will occur?
- ☐ What maximum load will be encountered? Will it be constant or cyclic?
- ☐ What types of atmosphere or other corrosive conditions?
- ☐ What size or shape of the parts or sections?
- ☐ What further processing will be done, such as welding or machining?
- ☐ What abrasive or wear conditions will be encountered?

The nickel stainless steel family can serve you in a wide range of high-temperature operations. That's why it's best to bring your metal problem to Inco's High Temperature Engineering Section. They are fully prepared to give you practical answers on the metal that will work best in your application. A note to Inco will bring you the "High Temperature Worksheet" to guide you in describing your metal problem.

LITERATURE

The publications listed below will provide more detailed information on choosing metals for high-temperature service.

PUBLICATION NUMBER	NAME
A266	Heat Resistant Castings, Corrosion Resistant Castings . . . Their Engineering Properties and Applications
A227	Stainless Steel for Pressure Vessels
	High Temperature Corrosion in Refinery and Petrochemical Service
A164	Thermal Expansion Characteristics of Stainless Steels Between −300°F and 1000°F
A248	Compilations of Chemical Compositions and Rupture Strengths of Super-Strength Alloys

A complete listing of Inco publications and technical bulletins can be obtained by writing for "List A" to:

The INTERNATIONAL NICKEL COMPANY, Inc.
67 Wall Street INCO New York 5, N. Y.

INCO NICKEL

NICKEL MAKES ALLOYS PERFORM BETTER LONGER

Pay the Piper

Internal revenue collections in fiscal 1960 totaled $91.8 billion compared with $75.1 billion in 1956.

Since 1943, local, state, and federal governments have taken almost 30 per cent of the value of all goods and services in the U. S., except in two years when the take declined slightly.

Those statistics are accurate, and this story might be . . .

John Smith completed his college education under the G.I. bill. Although financially pressed at times, he never allowed his National Service Life Insurance to lapse. He bought his home in a pleasant rural area with the aid of a veteran's loan.

He didn't plant certain crops to qualify under the government's farm subsidy program, but he planted others with the advice of the county agricultural agent.

In time, his children went to public schools. They rode a school bus and ate lunches provided with the help of a federal program. His whole family used the public library.

Mr. Smith was a pillar of his community and successfully campaigned for improved mail delivery, rural electrification, and the building of a nearby dam with federal funds.

In due course, he started a small business, using Small Business Administration assistance. He successfully lobbied to get a new highway rerouted closer to his plant. Mr. Smith prospered, and his bank account was insured by the Federal Deposit Insurance Corporation.

One day he wrote this letter to his Congressional representatives:

"I protest the continuing high corporate and personal tax rates. I protest the high budgets presented by this administration and the careless appropriations by Congress.

"Hereafter, I shall give my support and my vote only to those representatives who stand for the thrift, free enterprise, and rugged individualism that made this country great."

John S. Morgan

ASSOCIATE MANAGING EDITOR

This is McKay

McKAY DIE SHEAR LINES CUT MORE THAN STEEL. The most economical and efficient shear lines in operation today, they are being used by dozens of leading metal producers, fabricators and warehouses to slash shearing costs. Here, McKay Sales Manager Joseph F. Lyden, Jr., and M. G. Slaney, Building Division Manager, The Parkersburg (W. Va.) Rig and Reel Company —one of the nation's fastest growing manufacturers of pre-engineered metal buildings— examine panel sections cut to length by the high speed McKay Die Shear Line in the background.

Photo by Arnold Newman

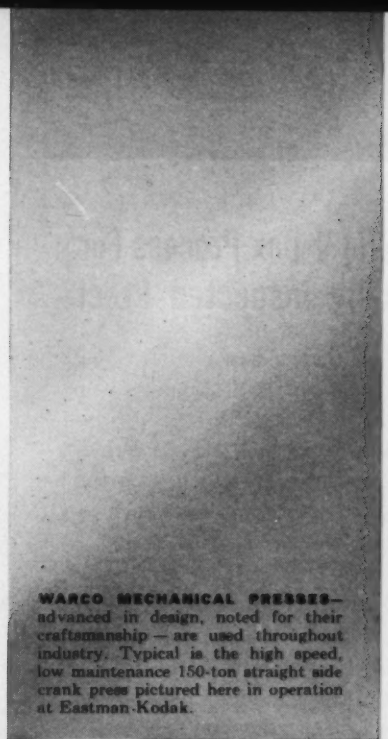
Machine....

a recognized leader in the development and manufacture of high production metal processing equipment!

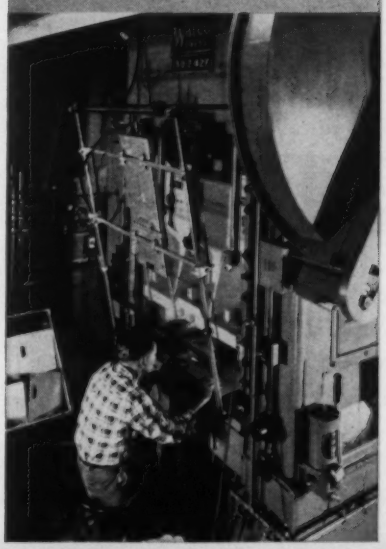
If you fabricate metals and are caught in the "profit squeeze" you'll want to know more about McKay Machine.

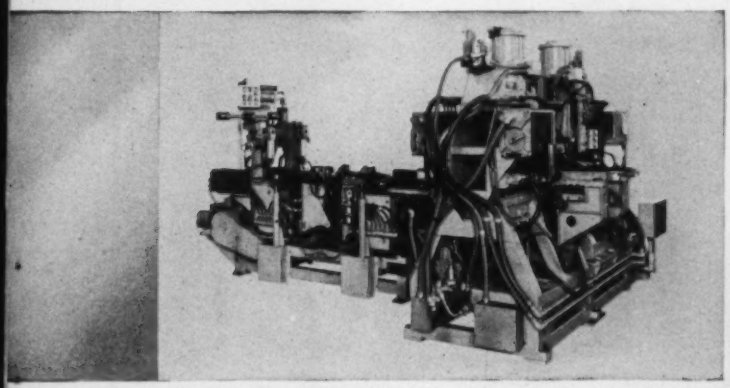
It was McKay Machine that pioneered automated integrated production lines, and it is McKay Machine that is today a leader in this field. We have conceived and produced complete lines for the manufacture of building panels, aircraft and missile sections, appliances, cabinets and components, automotive bodies and parts, and farm equipment—lines that are completely automated from *raw material to finished part or product.*

Whatever you make, if it requires metal handling, feeding, slitting, shearing, stamping, welding or forming, it's just good business to acquaint yourself with *McKay Packaged Production Lines*—high speed production equipment engineered to work in unison—with one-source responsibility from start to finish. Write for literature to *The McKay Machine Company, Youngstown 1, Ohio.*



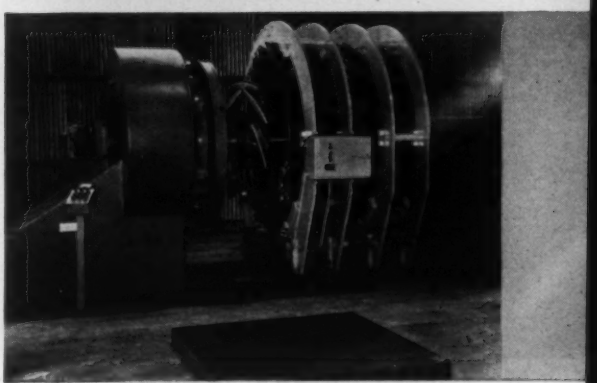
WARCO MECHANICAL PRESSES—advanced in design, noted for their craftsmanship — are used throughout industry. Typical is the high speed, low maintenance 150-ton straight side crank press pictured here in operation at Eastman-Kodak.



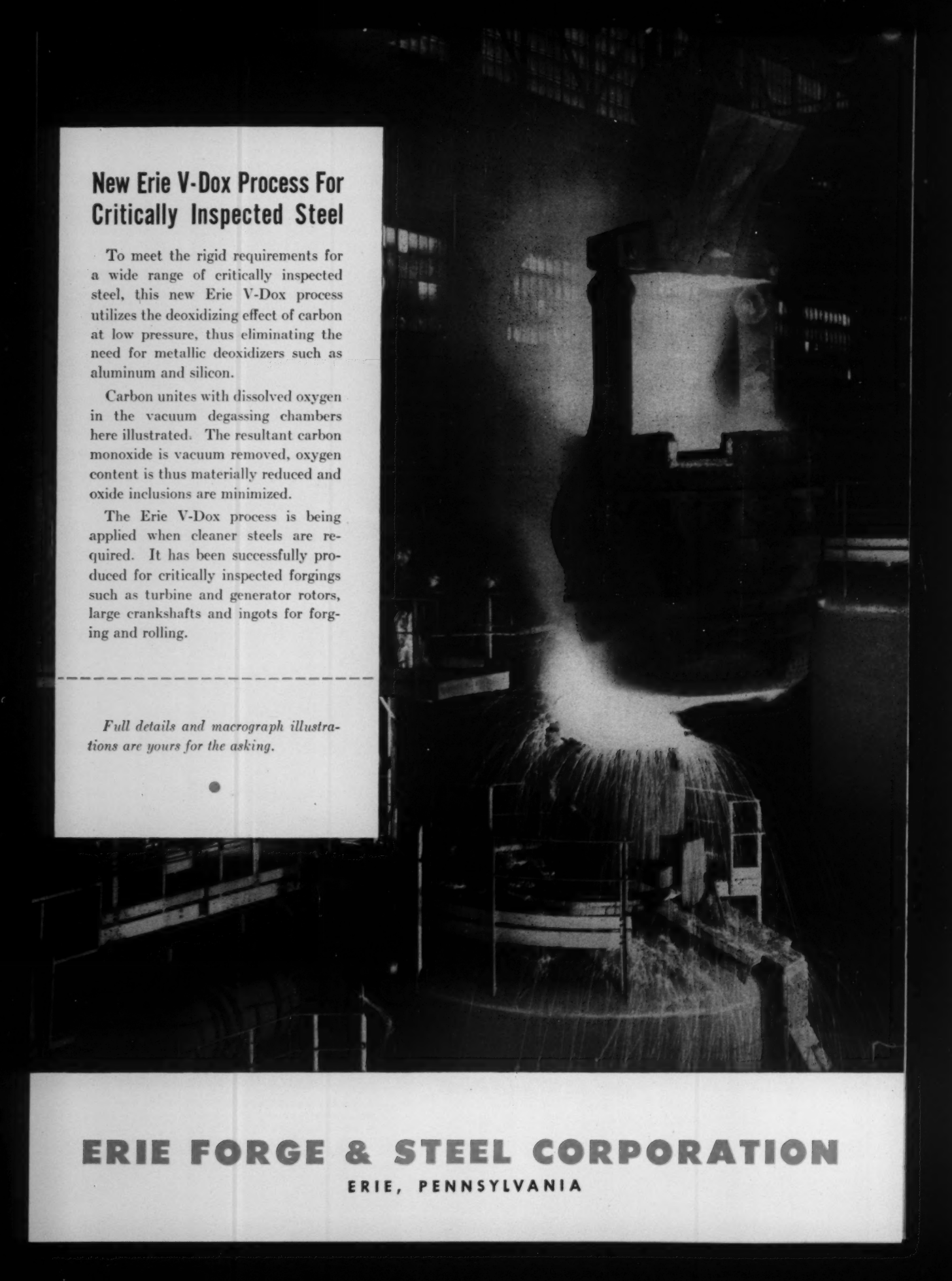


FEDERAL RESISTANCE WELDERS AND WELDING LINES, like this multi-gun combination spot and projection welder used by Hotpoint on their range production line, can be found in the plants of leading metalworking firms the nation over. Individual units, or complete resistance welding lines, are engineered to specifications by McKay's Federal-Warco Division.

LOOK TO McKAY MCK MACHINE



BERKELEY-DAVIS AUTOMATIC ARC WELDING MACHINERY produced by Berkeley-Davis, Inc., a subsidiary, is highly popular in the aircraft, rocket, automotive and appliance industries. The rocket body welder pictured here is working at Aerojet General, subsidiary of General Tire and Rubber Company.



New Erie V-Dox Process For Critically Inspected Steel

To meet the rigid requirements for a wide range of critically inspected steel, this new Erie V-Dox process utilizes the deoxidizing effect of carbon at low pressure, thus eliminating the need for metallic deoxidizers such as aluminum and silicon.

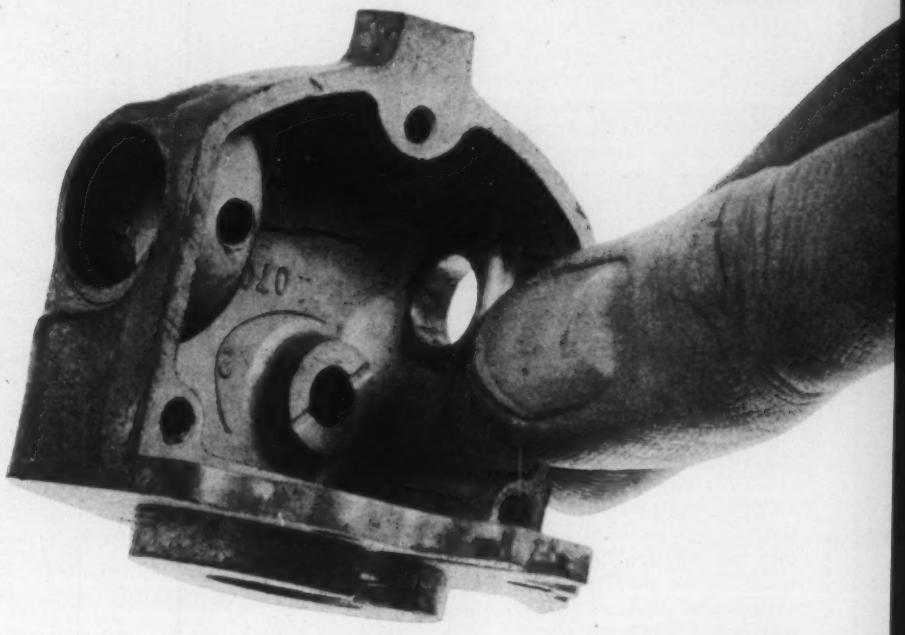
Carbon unites with dissolved oxygen in the vacuum degassing chambers here illustrated. The resultant carbon monoxide is vacuum removed, oxygen content is thus materially reduced and oxide inclusions are minimized.

The Erie V-Dox process is being applied when cleaner steels are required. It has been successfully produced for critically inspected forgings such as turbine and generator rotors, large crankshafts and ingots for forging and rolling.

Full details and macrograph illustrations are yours for the asking.

ERIE FORGE & STEEL CORPORATION

ERIE, PENNSYLVANIA



Thinner walls, closer tolerances, better strengths are objectives in diecastings. Holes for driveshafts in this gear case are held to 0.0005 in. "as cast"

Lead, Zinc Producers Turn to R&D

TWIN PROBLEMS — overproduction and status quo consumption— continue to be big headaches for U. S. lead and zinc producers.

Industry leaders hope that a medication of voluntary curtailments, government help, rising consumption outside the U. S., and a little better demand at home will provide temporary relief from the first problem. They're accelerating research and development programs to attack the second in hopes of developing new and expanded uses.

• **Sales Slid in '60**—The recession was hard on both metals. Lead consumption fell to 1,026,000 tons from 1,091,000 tons in 1959. Slab zinc shipments dipped to 831,238 tons compared with 893,838 tons in 1959. Demand is still spotty but improving. Modest gains for both metals are expected this year, with demand in the second half topping that of the first.

• **Too Much Metal**—Hanging over

Where They're Spending Research Dollars*

LEAD . . .

Lead coated steel for container stock.
Rust preventative ferrous metal paint.
High speed plating.
Better wrought products through powder metallurgy.
Metallic fiber reinforced lead.
Sound, vibration control materials.
Lead in ceramics.
New applications for lead chemicals.

ZINC . . .

New diecasting finishes.
Electrochemical finishes.
New areas for zinc-steel composite materials.
Galvanized steel reinforcing bars.
Better diecasting alloys.
Better wrought products through powder metallurgy.
Galvanized steel roof construction for solar heating.
Improved lithographic plates.

*Some of the programs being conducted by the American Zinc Institute Inc. and Lead Industries Association.

the U. S. market is the reality of world overproduction, a big factor in keeping prices soft and discouraging any rush by consumers to buy metal. Symptomatic: U. S. producer stocks of refined lead shot up to a hefty 227,826 tons at the end of March, reports the American Bureau of Metal Statistics. (The rest of the Free World combined has stocks of only 176,038 tons.) Official figures of the American Zinc Institute Inc. show slab zinc stocks of producers at the end of March were 219,253 tons.

Quotas imposed on imports of the two metals in 1959 have given domestic producers some relief. The demand-supply balance should ease a little over the year—most producers have trimmed output. Foreign producers have followed suit under voluntary agreements worked out through the United Nations. Helping, too, will be the U. S. government's barter program under which agricultural products are exchanged for foreign lead which is placed in our stockpile.

• **Picture in Europe**—In contrast with the U. S., European consumption of both metals has been rising steadily. (On a world basis, both lead and zinc consumption set records last year.) Free World production and consumption of zinc both have risen about 110,000 tons a year since 1958, reports R. L. Stubbs, director-general of the Lead & Zinc Development Associations, London.

This year, believes Mr. Stubbs, Free World zinc production will hit around 2.8 million tons (vs. 2,673,000 tons last year) and consumption about 2.84 million tons (vs. 2.7 million tons in 1960). The zinc surplus will be about 55,000 tons, he predicts.

The lead situation is a little different. World consumption has risen since 1958, but only by about 60,000 tons a year, says Mr. Stubbs. Supplies have exceeded consumption each year since 1957. Mr. Stubbs estimates for 1961: Free World lead production of 2,420,000 tons; consumption of 2,500,000 tons; supplies about 55,000 tons under estimated consumption.

• **The Challenge**—U. S. producers have their work cut out for them. Domestic consumption of both metals is under what it was in 1950. To meet the challenge, the industry is banking on expanded research programs (see Page 57).

The industry started its research efforts late and will have to wait before laboratory breakthroughs begin to pay off.

Lead-acid batteries are powering more vehicles like golf carts, lawn mowers, and delivery trucks. More than 347,200 tons of lead were consumed in storage batteries last year

Lead's New Look

The lead industry boasts several new uses—some that may be important future markets, and some that are mainly important because they suggest to the designer to take a second look at an "old" metal.

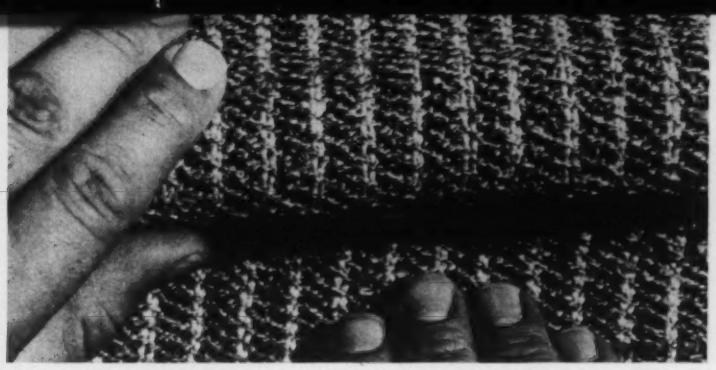
• **Thermoelectrics**—Lead in combination with tellurium (lead-telluride) is the most efficient material known for thermoelectric power generation. Lead-telluride generators can attain conversion efficiencies of about 7 to 9 per cent—not enough for land based utilities but fine for auxiliary power and portable power packages. Several such devices are already on the market.

• **Piezoelectricity**—Volume business for lead-zirconate-titanate ceramic (65 per cent lead oxide by weight) is beginning to be found in sonar devices and ultrasonic cleaning. (The principle: Electricity is generated when pressure is applied.) Many new and potential uses are cropping up. Example: The spark pump which changes mechanical energy to electrical energy. It replaces the coil, points, condenser, and magneto.

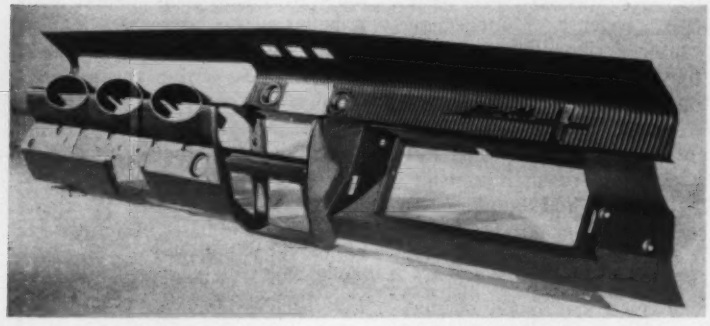
• **Rattles and Roars**—Uses for vibration control and sound damping are growing. The biggest market has been in vibration controls. There's a lot of interest in lead as a soundproofing material in such areas as movable partitions, curtains, ship hulls.

• **The Atom**—Almost every phase of the expanding nuclear energy industry makes use of lead as a shielding material, including power reactors, atomic submarines, and research.

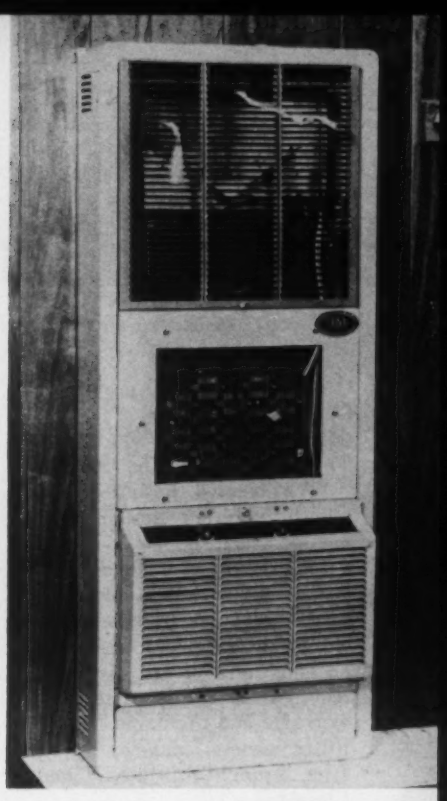
• **Electric Vehicles**—The industry is excited about the potential of bat-



Noiseless fabric "movable wall" contains lead wires for soundproofing



Last year's cars used an average of 55 lb of zinc diecastings. This dash console for the 1961 Oldsmobile is nearly 5 ft long, 12 in. wide, 5 in. deep and is the largest interior diecasting ever used in a car



Lead telluride thermoelectric unit (center) uses waste heat to generate power for space heater fan

tery powered vehicles. Biggest use: About 40,000 battery powered golf carts are in service. In a decade, that many units are expected to be produced each year for recreational uses and a like number for industrial service. Lawn mowers are another possibility—one model is in production.

The biggest potential could be in electric, multistop delivery trucks (milk, bread, dry cleaning, perhaps even utility vehicles). One source estimates the market could exceed 150,000 units.

Lead's future in its biggest market, the automotive battery, shapes up like this, says C. Herbert Allen, president of the Association of American Battery Manufacturers: The trend toward longer battery life and less lead per battery will continue. That's the negative side. The positive side: Increasing population, more multicar families.

Zinc in Autos

The fastest growing market for zinc is the automotive industry. Brightest prospects are galvanized sheet applications in the chassis. This use hit an all-time high of 218,960 tons in 1960 (compared with 158,280 tons in 1959). The trend will continue. Reasons: Increased needs for a corrosion resistant material because of the move to unitized construction, increased use of light-colored exterior paints (which show rust streaks more readily), and greater use of salt on city streets for snow and ice control.

Automotive use of diecastings also looks promising. E. C. Quinn, vice president, sales divisions, Chrysler Corp., estimates auto zinc diecasting usage should go up 17 per cent in the '60s if present consumption patterns continue.

Another market for galvanized steel: The interstate highway system. One source estimates 15 million tons of galvanized steel will be needed.

Alloy development is also helping zinc's potential. Promising: Zamak-7 (zinc, aluminum, magnesium, copper) alloy that is said to be easily cast and economical to use. Also promising: New zinc-titanium-copper alloys.

Short Term Outlook

Sales of prime Western zinc to continuous galvanizers are booming, and producers see no letup. Demand for special high grade zinc is another story—sales have been slow due to slack demand from automakers. Not only are fewer cars being built; the compacts use less zinc diecastings.

For lead, production and imports will be down the rest of the year. If sales hold at the first quarter rate, supply and demand will be pretty much in balance.

● **Price Prospects**—Look for prices to stay at or near present levels through the year. Neither zinc nor lead is strong now (considerable discounting is still going on in the premium zinc grades, for example) but it's doubtful prices will fall. Some strengthening is possible later in the year—but only if business picks up substantially.

• *An extra copy of this article is available until supply is exhausted. Write Editorial Service,* STEEL, *Penton Bldg., Cleveland 13, Ohio.*

Buying or Selling . . .

Long Term Contracts Can Pay Off

CAUGHT in the cost-profit squeeze? Check the advantages of buying and selling under long term contracts. The benefits can be high.

"We boosted business $1850 a month with one customer," commented a tool supplier.

"We saved $45,000 in buying a year's supply of pipe and fittings," said a Midwest purchasing agent.

"We're convinced that blanket or long term orders, for materials required at regular intervals, are workable and profitable," said Tom Ritter, general manager of supply sales, Strong, Carlisle & Hammond, Cleveland.

A case in point: "One of our customers had been placing 50 orders each month for maintenance, repair, and operating (MRO) supplies," he noted. "The average billing was $73 per order. When we figured out how much those orders cost in paperwork, check writing, and material handling, among other factors, the customer revised his 'buy laws' and now places five orders a month to the tune of $1100 per order."

• **Buyers Benefit**—"There are considerable advantages to this type agreement," asserts Joseph A. Teece, vice president and director of procurement, Fansteel Metallurgical Corp., North Chicago, Ill. "Prices are firm in most contracts; supplies are steady; inventories are minimized; and paperwork is reduced or eliminated . . . and this frees buyers to do more research and creative buying." He adds: "In practically every instance, we have been able to receive an advantage on price, which goes to make such buying habits profitable. I believe our company will increase long term buying over the years."

Fansteel won't be alone. Respondents to a STEEL survey forecast (by a margin of 19 to 1) that long term buying and selling will gain.

• **Value Helps**—"The emphasis on value analysis and value engineering will foster the growth of long term buying," says Bertrand L. Hansen, course director, Ohio State University Defense Management Laboratory, Wright-Patterson Air Force Base, Ohio. "Aside from price, delivery, quality, and service, buyers should consider the contribution values in any purchase. A seller will usually do more research, consulting, engineering, and development for a buyer under a long term purchasing contract. All of those add value to the purchase."

The producer has much to gain from long term sales. "They allow the supplier to set up his buying and production schedules in an efficient manner. This saves him money which he can pass on to you," observes G. W. Howard Ahl, executive secretary-treasurer, National Association of Purchasing Agents, New York. The vender can schedule runs of contract items during slack times. It keeps his equipment running and his labor force together. Some suppliers make a straight two-month production run to meet requirements of a long term commitment, then store the products for release at the customer's convenience.

• **Consumer Speaks**—Gunite Foundries Div., Rockford, Ill., Kelsey-Hayes Co., buys and sells under extended contracts. D. P. Forbes Jr., director of purchases, says: "We sell on the standard automotive contracts with price reopeners based on changes in specifications, metal market, or labor. This comprises about one-half of our total sales. We purchase most repetitive volume raw materials, supplies, and components on a yearly cancelable blanket order and release . . . committing us to a three month firm schedule—although deliveries are flexible."

Mr. Forbes avows that long term buying and selling will grow more popular because the arrangements are simple and beneficial to all parties. He says there may appear to be a disadvantage in commitment to a material for a short period when a better or less expensive material comes on the market. However, he continues, testing the new material often consumes as much time as is required to cancel the former obligation, so the burden is illusory.

• **For and Against**—L. W. Pierce, director of purchases, American Machine & Foundry Co., Brooklyn, N. Y., buys expendable tools, services, packing material, hospital and safety supplies under six month or year long blanket orders; and he intends to explore additional areas. On the other hand, Lloyd L. Stouffer, vice president, Pangborn Corp., Hagerstown, Md., says: "We do not buy or sell under those agreements. We can only see an increase in the event of runaway inflation. In that case, buyers would seek to cover their requirements for much longer periods."

From a sales standpoint, Wheelabrator Corp., Mishawaka, Ind., has few long term contracts. "Less than 10 per cent of our abrasive sales are against blanket orders," says G. O. Pfaff, director of marketing. "Where a long term contract exists, the salesman generally has a close working relationship with the customer. It's more efficient. We are always trying to increase selling and buying via this technique, but competitive factors work against it. No small matter is reciprocity."

W. E. Gombert, purchasing agent, Addressograph - Multigraph Corp., Cleveland, contracts for window washing, laundering of employee uniforms, and dispensary services, and miscellaneous components. He says: "We enter the agreements only if no engineering changes are in the offing; needs can be estimated, and costs can be cut."

E. G. Ward, vice president-purchasing, Ford Motor Co., Dearborn, Mich., says: "We make a great

deal of use of blanket orders, generally of a year's duration or less, for production parts, assemblies, raw materials, and MRO supplies. We use longer term agreements only when special circumstances arise."

• **Manpower De-emphasized**—K. A. Cruise, materials manager, Kansas City (Mo.) Div., Bendix Corp., has been using long term contracts for a number of years. "Currently, our department is embarking on a program of using blanket orders for productive hardware items, standard gaskets, and bearings . . . A lower classification of people can handle releases against blanket orders. The original negotiation is handled by an experienced buyer and then turned over to those people."

Close co-ordination among departments is essential when blanket orders are undertaken. That fact is underscored by Joseph H. Cadieux, president, Castings Engineers, a Chicago division of Consolidated Foundries & Mfg. Corp. "You run the risk of relaxing your controls and ending up with a large supply of some commodity due to shipments continuing at existing levels when production is curtailed."

F. B. Drake, general purchasing manager, Air Products Inc., Allentown, Pa., mentions: "Unless escalation clauses are carefully written, a buyer might get caught in a falling market." Aside from that point, Mr. Drake says Air Products has reduced paperwork, time, and costs through long term contracts.

Jim Barlow, director of purchasing, Leece-Neville Co., Cleveland, buys on long term contracts. He asserts: "It takes firm selling and buying efforts. There must be mutual trust. The buyer and seller must integrate efforts." That sentiment is echoed by E. F. Gorman, director of purchases, Chevrolet Motor Div. of General Motors Corp.: "We agree that long term contracts could offer many advantages. But to be equitable they must be made on a firm basis. The so-called long term contracts, carrying many and varied escalator clauses and formulas for adjustments for all changes in material and labor costs and other contingencies, offer many disadvantages, particularly to the buyer. They eliminate competitive evaluation of market changes."

• **What's Needed?**—Conn Clifford, director of purchases, Buick Motor Div., GMC, Flint, Mich., reasons: "Every transaction evolving from every requirement must be analyzed in detail as to the most advantageous method of handling the purchase, and a decision made on the basis of the facts in existence at the time of the purchase agreement must be consummated."

That's the common thread. There are no pat formulas because too many variables exist. Accounting systems, product mix, inventory control, markets, costs, and policies vary from company to company, industry to industry.

Long term purchasing can cut generation of paper and lower costs. It can smooth production, both for the buyer and seller, and it can mean more efficiency. The task of negotiating an equitable contract is tough—but the rewards can be worth the effort.

Blanket Orders Reduce Paper Handling

"We have found blanket or open orders for stock items with single supply sources advantageous," says W. J. Eck, general manager, Purchasing & Stores Dept., Chesapeake & Ohio Railway Co., Cleveland. In a talk scheduled for this week at the 1961 Coal Show of the American Mining Congress in Cleveland, he outlined a hypothetical cost formula that charts the frequency of orders for optimum economy. Factors considered: Cost of money tied up in inventory, cost of preparing orders, cost of processing invoices. (Costs of space, deterioration, and obsolescence in manufacturing may be weighted into the formula.)

Presume: Annual value of money equals 12 per cent
Average value of money equals 6 per cent (½ x 12)

In the table below, the cost of a $25 order is $3.50 ($2 for paper processing, plus $1.50 for the tieup of money in inventory for an average of six months or, 6% x $25). On a twice a year basis, the paper costs would be 2 x $2, or $4, plus average cost of money in inventory: $25 x 6% x ½ or 75 cents.

• Example—If ten identical $10 items are used in a year, the annual value is $100 (10 x $10 = $100). The optimum order frequency is twice per year, at a total cost of $7.

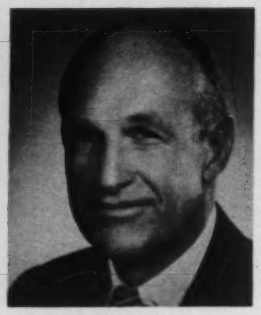
How to Find Economical Order Rate for Identical Items

Total Annual Value Per Item	$25	$50	$100	$250	$500
Orders Per Year	Total Cost for the Number of Orders Per Year				
1	$ 3.50*	$ 5.00*	$ 8.00	$17.00	$32.00
2	4.75	5.50	7.00*	11.50	19.00
3	6.50	7.00	8.00	11.00*	16.00
4	8.38	8.75	9.50	11.75	15.50*
5	10.30	10.60	11.20	13.00	16.00
6	12.25	12.50	13.00	14.50	17.00

*Indicates most economical order frequency.

"There will be a steady increase in steel service center participation in the distribution of industrial steel products."

ROBERT G. WELCH
Executive Vice President
Steel Service Center Institute
Cleveland



"Technical training advances will provide service center customers with latest data on new grades of steel."

F. H. LOVEJOY
Chairman
Wheelock, Lovejoy & Co. Inc.
Cambridge, Mass.

"Service centers will make many improvements in material handling equipment to speed the handling of orders."

J. J. HILL, III
Executive Vice President
Hill-Chase & Co. Inc.
Philadelphia

"Service centers will handle a broader range of products to meet the anticipated needs of their customers."

WAYNE RISING
Senior Vice President
Ducommun Metals & Supply Co.
Los Angeles

Steel Distributors Look Ahead

DISTRIBUTORS attending the 52nd annual convention of the Steel Service Center Institute in Washington this week are taking a critical look at their position in the economy in light of changing business concepts.

With producers and sellers of steel, nonferrous metals, plastics, and other materials clashing in a head-on battle for new and old markets, and with foreign competition intensifying, they're asking:

Do pricing practices need overhauling? Will present sales techniques be good enough in the competitive period ahead? Are plant and equipment adequate to meet expansion needs and combat the cost-price squeeze? How shall we orient our methods to resolve the market struggle involving the different metals and materials we carry for resale? Can we satisfy the growing demands for Space Age metals? How sound are our labor, trade, and public relations? Are we meeting our civic responsibilities?

The meeting is described as one of the most forward looking in the institute's history. An innovation this year: Representative European and Japanese distributors (called steel stockholders and steel merchants abroad) are attending as guests of the institute.

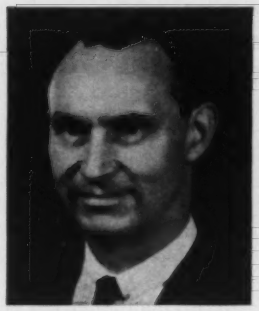
• **Looking Ahead**—Many distributors think that critical examination of their methods and practices may disclose the need for revolutionary changes which cannot be prudently delayed.

That position was taken by a former president of the institute, George L. Stewart, vice president, Jones & Laughlin Steel Warehouse Div., Indianapolis. At last year's meeting he said: "It's time we begin thinking in terms of revolutionary changes. If we don't, then someone else—the government, our foreign competitors, other industries—is going to take over and cram some changes down our throats."

• **Change No Stranger**—Actually, the $2 billion steel distributing industry is no stranger to change. In the last quarter century, it has undergone a major transformation (even the name of its trade organization has changed—it used to be American Steel Warehouse Association).

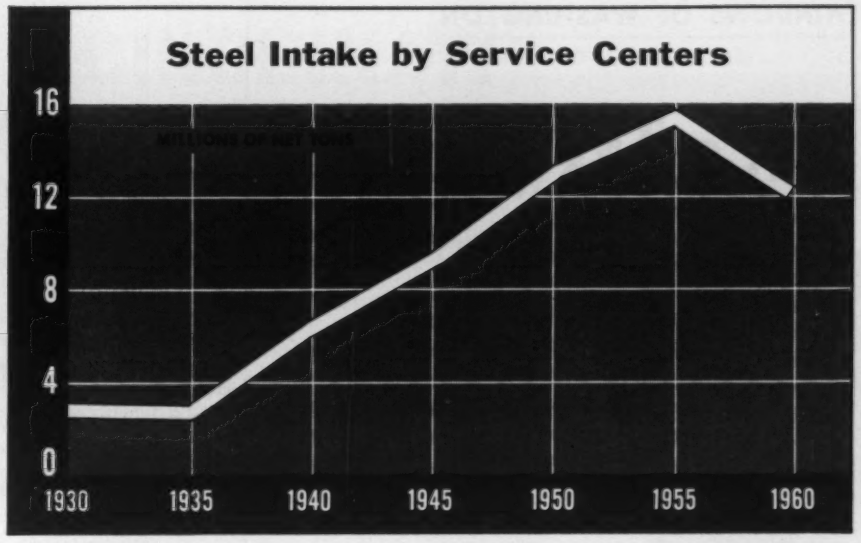
The industry comes under the category of small business. While some large companies operate chains of service centers on a regional and national basis, the majority of distributors gross under $1 million annually.

While still holding to the traditional function of storing steel for resale, the industry has strengthened its position in the economy by broadening supply lines to include other metals and materials (aluminum and plastics) and by offering a variety of processing and fabricating services—including slitting, shearing, sawing, grinding, edge rolling, flame cutting, burning, leveling, coating, and annealing. The book value of its equipment exceeds $250 million. Employment in the industry is more than 40,000.



"Tomorrow's service centers will be prepared to handle a steady increase in the service requirements of their customers."

JOHN H. MORAVA
President
United States Steel Supply Div.,
U. S. Steel Corp.
Chicago



"New accounting and management techniques will enable service centers to keep better control over their operations despite anticipated cost increases."

C. L. HARDY
President
Joseph T. Ryerson & Son Inc.
Chicago

"In the future, steel consumers will have a much better understanding of the important savings available to them through the steel service centers."

RALPH W. SHAW JR.
President
A. R. Purdy Co. Inc.
Lyndhurst, N. J.

Distributors are promoting the cost saving possibilities of: Reductions in overhead in idle raw material stocks, unnecessary storage space (that can be more productively utilized), heavy investment in equipment that's used only intermittently, scrap losses, plant and equipment obsolescence, insurance, taxes, and accounting.

Broadening of function has brought increased status to the role of the service centers in steel distribution. They annually move into consumption 17 to 20 per cent of all the steel products rolled in this country. Last year, their intake from the mills was 12.5 million tons, equal to 17.5 per cent of total mill shipments. Distributors handling industrial steel products (sheets, bars, plates, shapes, stainless, and tool steels) alone moved 6,150,000 tons in 1960, which was not one of the trade's better years.

• **Expects Growth**—A survey showed 25 to 30 per cent of service center customers provide 80 per cent of the industry's volume and 85 per cent of its profits. That means, while the distributors service over 500,000 customers of all kinds every year, processing in excess of 25 million separate orders (normally averaging over 800 lb apiece), the bulk of their tonnage is taken by only about 40,000 firms—and most of them also buy direct from the mills.

Robert Welch, executive vice president of the institute, thinks the industrial steel service centers can increase their market participation to 10 million or 12 million tons annually in the next five years. He says the industry, with floor space of about 45 million sq ft, is equipped to handle 25 to 30 per cent more tonnage. The industry normally stocks about 3 million tons.

• **Shrinking Profits**—Probably the most critical concern of distributors centers on their shrinking profit margins. Thirty years ago, a net profit of 25 per cent on investment was not uncommon. Today, the industry averages no more than 3 per cent on sales, and 8 per cent on net assets after taxes. That's not adequate to maintain the industry in a sound economic position, says Mr. Welch. He not only urges distributors to increasingly examine their costs, but to participate in political action programs. Many of the problems hampering business growth and efficiency are basically political, he feels.

JFK's Tax Plan Faces Many Hurdles

Wilbur Mills

Industry is expressing its views to House Ways & Means Committee

INDUSTRY is answering the call of the House Ways & Means Committee to voice attitudes toward the President's tax program. Testimony on the Surrey Plan to boost capital spending started May 12; comments on expense account practices begin May 19; businessmen concerned about JFK's new plan for taxing foreign income will appear June 5. During the hearings, which are scheduled at least through June 9, close to 200 witnesses will parade before the committee.

Chairman Wilbur Mills (D., Ark.), the House's leading tax authority, is worried about the administration's approach to the tax proposals: The White House has not given the committee a draft of the proposed legislation. In a sense, this means committee members are questioning witnesses on proposals about which neither side is too clear.

Representative Mills's staff and Treasury Secretary Dillon's advisers are drafting the bill now. Some committee members are afraid the work won't be finished until the public hearings are over and the committee meets in secret session. Look for the committee to hassle over making the language of the bill known to the public before any vote is taken.

● **MEMBERS ARE CRITICAL**—Here's a rundown of committee reaction to the proposals:

Howard Baker (R., Tenn.), the incentive program has "a great deal of merit" . . . Thomas Curtis (R., Mo.), "this (Surrey Plan) is not a substitute for updating depreciation practices" . . . Victor Knox (R., Mich.) is wondering about the relationship of the President's proposal on expense accounts to the State Department's use of funds for entertaining . . . James Utt (R., Calif.) supports the incentive but wonders why small utilities are excluded. He wants organized labor's "tax havens" (welfare funds) looked into . . . Jackson Betts (R., Ohio) asked why a general depreciation reform wouldn't be better for industry . . . Bruce Alger (R., Tex.) believes the administration's reasons for initiating the Surrey Plan are also good reasons for a general corporate tax cut . . . Herman Schneebeli (R., Pa.) is concerned that the carryover principle of the incentive plan will lead to bunching of capital spending . . . John Byrnes (R., Wis.) asks why the treasury has not come forth with more detailed language. He opposes killing deferrals of taxes on foreign income . . . Hale Boggs (D., La.) will oppose the plan to halt deferrals of taxes on foreign income . . . Frank Ikard (D., Tex.) thinks the expense account ceilings are too low . . . Burr Harrison (D., Va.) thinks the incentive program is not wanted by business.

● **DILLON MAKES A PROMISE**—The treasury secretary countered committee arguments against the Surrey Plan by noting that the President's message on helping the textile industry could lead to an "administrative decision" to shorten the lives of textile machinery. The textile part of the over-all depreciation study should be completed by August.

The secretary's new emphasis on the problem of machinery lives probably forecasts a revision of Bulletin F next year. Secretary Dillon spoke several times to the committee about machinery becoming obsolete before its useful life (as defined by treasury) is ended.

The secretary added: "Basic reform is a highly desirable objective," but the need for the Surrey Plan is now clear. He noted some treasury interest in corporate tax rates. He hinted that "some other type" of tax relief would be preferred to the Baker-Herlong formula (which calls for a cut in corporate taxes over a five year period). He discussed the "theory" that our present tax structure will give us a big surplus when we get back to full capacity operations, and he didn't rule out treasury's acceptance of that theory, which would involve a cut in corporate taxes to speed the return to full capacity operations.

● **GOLDBERG ASKS UNION SUPPORT**—The biggest gun the administration has against labor opposition to the Surrey Plan is ex-Steelworker attorney, Arthur Goldberg, secretary of labor. His appearance before the committee last week leads observers to predict that unions will not oppose the measure extensively. The secretary repeated that increased investment in plant and equipment is "necessary."

● **GAINS TO BALANCE THE LOSS**—Budget Chief David Bell again pounded home JFK's concern that the Surrey Plan's $1.7 billion cost to the treasury be balanced by closing foreign tax havens, killing the deferrals on taxes from income gained in western Europe and Japan, and limiting expense account deductions. In the fiscal 1962 budget, he expects a deficit of $2.8 billion, plus another $800 million if Congress doesn't raise postal rates.

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If you employ heat as a manufacturing tool, you will benefit from Cincinnati Advanced Heat Engineering. Write direct, or discuss your requirements with a Meta-Dynamics application engineer.

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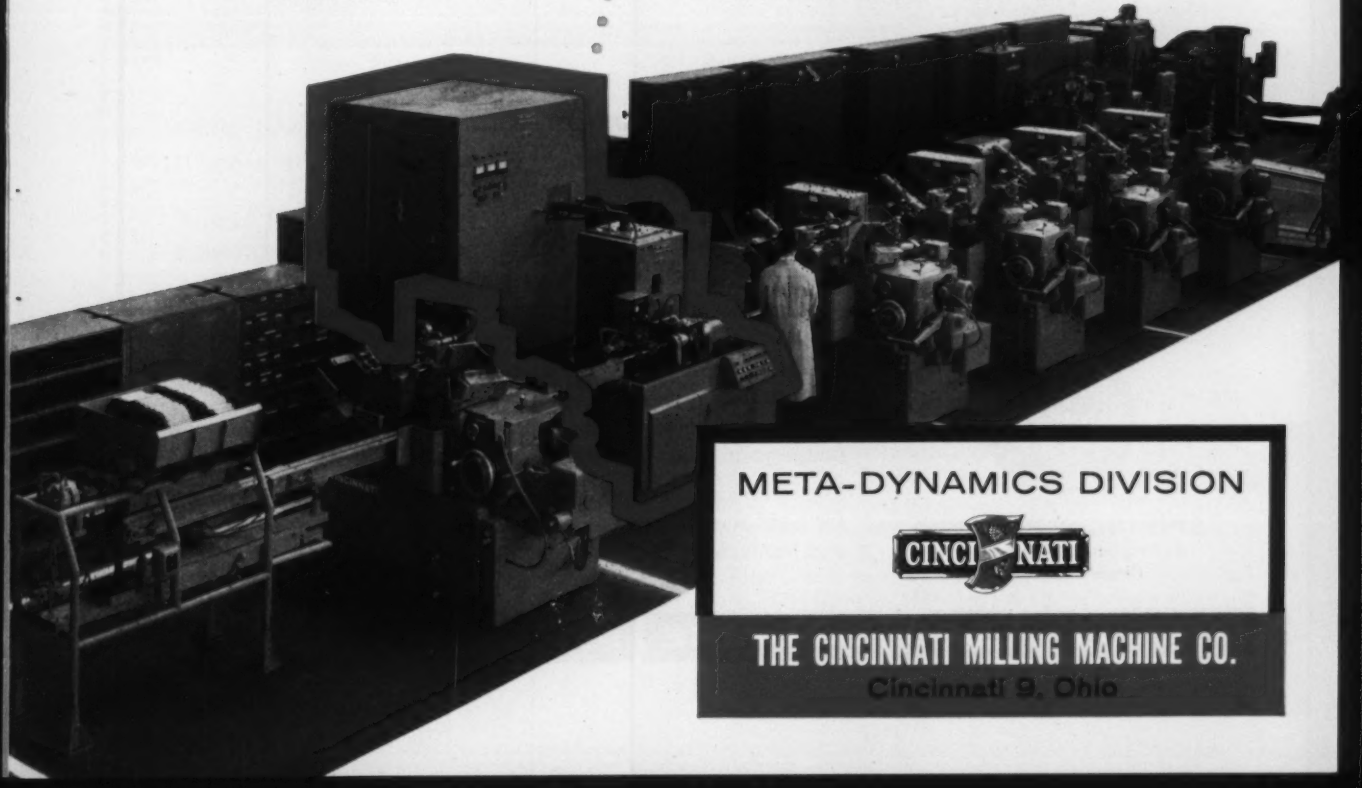

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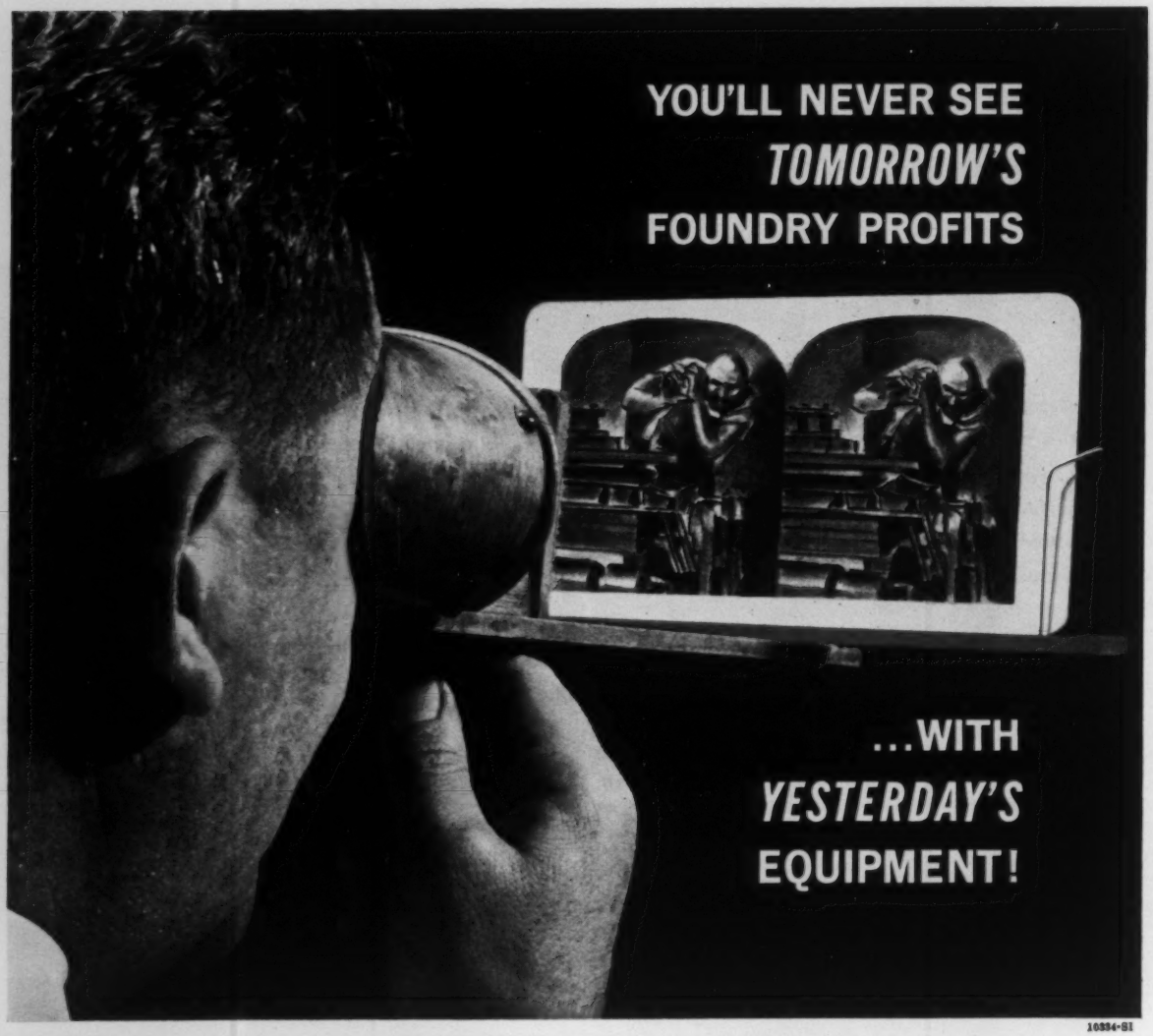

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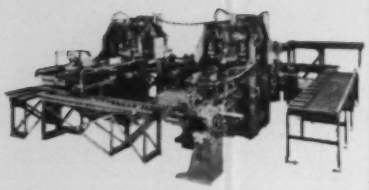

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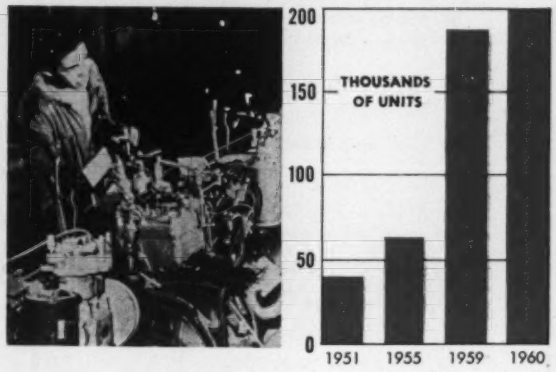
Old machines and equipment are not necessarily "old friends" . . . and their hidden costs of operation can wipe-out your chances of survival in highly competitive situations.

Just as the old fashioned stere-o-scope has been replaced for "seeing", production mechanisms for the foundry have been replaced for "doing". It is important that we remind you that all improvements have not been devoted to total automation . . . and SPO has engineered a complete line of machines that will nudge your profit/loss figures well into the black.

For complete information, call DIamond 1-3666 or write today for additional information. You will be under no obligation . . . and the facts will serve you well.

THERE'S A SPO MACHINE FOR EVERY MOLDING JOB

Latin Vehicle Output Rises



AUTO, TRUCK, and bus registrations in Latin America jumped from 1.7 million to more than 4.2 million between 1950 and 1960. Brazil, Argentina, Mexico, Venezuela, and Cuba head the list, but Uruguay has the fewest number of people per vehicle.

The rise in registrations has been accompanied by an equally significant growth in domestic vehicle assembly and manufacture (see chart). Assembly was first done in Mexico in 1951; since then, Argentina, Brazil, Colombia, and Venezuela have joined the ranks. Vehicle manufacture began in Argentina during 1955. Brazil and Mexico have followed suit. At least 60 per cent of the units (by weight) are made locally.

Foreign capital and government incentives have played big parts in the auto industry's growth in Latin America. The industry accounts for about $500 million of value added by manufacture.

Machinemakers: Australia Wants You

Heavy machinery is a top drawer investment opportunity in Australia for U. S. metalworking manufacturers, declares William Flood, New York based engineering specialist for the New South Wales, Australia, government.

The country's rapid industrialization opens up opportunities, and it is an ideal base for exporting to the growing markets of Southeast Asia, emphasizes Mr. Flood.

Mr. Flood points out: "Australian steel is the cheapest in the world." Wages "are about half those in the U. S." The Australian government is encouraging exports through such devices as premiums and tax concessions.

• **Supporting View**—A recent U. S. trade mission to Australia was impressed with "the economy's vigor, growth, and potential."

"There is a preference for U. S. machinery," observed Philip Marsilius, vice president, Producto Machine Co., Bridgeport, Conn.

Ralph Binney, vice president, First National Bank, Boston, remarked: "The business climate is good; there's no language barrier; and the profit opportunities are great."

Annual output of Australian engineering industries is about $500 million. Their exports run $13 million. Some 1960 import figures: Electric motors, $10 million; textile machinery, $13 million; machine tools, $18 million; wheeled and crawler tractors, $40 million.

European Management Center to Open

The International Management Association, foreign arm of the American Management Association, will open the first management center in Europe on Sept. 1 at Brussels, Belgium. The need for management training abroad prompted the move. AMA has more than 2000 foreign members. In addition, the center will aid U. S. managers who wish to learn European management and business methods. The IMA reports that its management center in Sao Paulo, Brazil, which was opened last July, is a success.

Ex-Im Bank to Reveal New Guarantees

Sources say the new export guarantee plan of the Export-Import Bank of Washington will be unveiled soon. Manufacturers and exporters are advised to make their needs known to the bank immediately.

British Autos Up; Steel Off Target

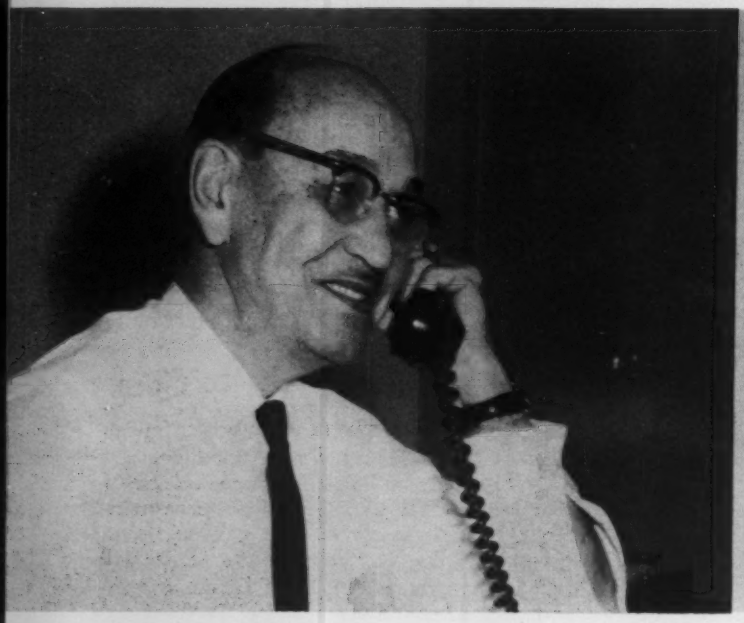
The British automobile industry is still in the uptrend that started two months ago. Plants are on a five day workweek. Growing overseas demand has cut the availability of cars for the domestic market. Ford, British Motors, Rootes, Standard, and Vauxhall claim growing waiting lists.

Although the steel situation remains good, production in the first quarter (6.9 million tons) was slightly below the annual rate predicted by the Iron & Steel Board last December. Nevertheless, the board is planning for a substantial surplus of capacity, so that imports will not be required to fill the gap during temporary upturns in demand. Target: An annual capacity of at least 31.6 million ingot tons by 1965.

Foreign Display Service Offered

U. S. and Canadian businessmen will soon be able to participate in foreign trade fairs without leaving their desks. Intermart, a Toronto, Ont., based firm, will transport, display, and promote your products at one or more of the major fairs in a package deal. The Canadian company claims its services cost less than doing it yourself.

Russia will be the biggest exhibitor at Australia's Sydney Trade Fair this August—it will have 450 tons of goods on display, 70 attendants. No plans for U. S. participation have been announced.



Six Tips for Savings

- **Make salvage a top management responsibility.**
- **Put one man in charge of all salvage operations.**
- **Use simple forms and systems for property disposal.**
- **Watch constantly for surplus or obsolete materials.**
- **Seek new uses and new markets for salvage goods.**
- **Sell on a competitive bid basis whenever possible.**

Howard Dreher, the man responsible for the job, tells how . . .

Fisher Body Makes Salvage Pay Off

CAN IT BE used elsewhere? Will the vender buy it back? Will it be needed again?

Those are questions management at every plant should ask before disposing of surplus or scrap materials, asserts Howard Dreher, general administrator of salvage activities, Fisher Body Div., General Motors Corp., Detroit.

Mr. Dreher should know. Fisher Body's 32 plants dispose of more surplus goods in 24 hours than most companies get rid of in a year. In one typical day, the division solicited bids on two station wagons, a sedan, and a dump truck; put up for sale three tow tractors, 19 types of used light fixtures, and 40 electric motors; and listed a ton of scrap cutting tools and several thousand yards of fabric and imitation leather trim.

Fisher Body seeks to minimize its losses on all scrap, surplus, and obsolete items. Mr. Dreher charges that too many companies simply junk materials instead of figuring out ways they could use them profitably. He's spent 35 years simplifying Fisher's salvage methods. His operation may give your firm some practical ideas.

Organize for Savings

Making salvage operations pay off calls for the direct backing of top management. The activity must be co-ordinated through a single department, Mr. Dreher believes. At Fisher Body, that responsibility is assigned to the general director of purchases, George Cook.

Materials to be salvaged are divided into five categories: Capitalized equipment and machinery, production parts and raw materials, production tooling, supply and expense items, and scrap materials. When any of those goods (except generated scrap) become obsolete or surplus, the salvage office is notified on inactive material report or inactive equipment report forms (IMR and IER).

The same general procedure is followed in all cases.

1. The department that's charged with the material or equipment is contacted first to find out whether it can re-use it or wants to dispose of it.

2. If the department doesn't want it, other groups within the division are surveyed to find out whether they can use it either "as is" or by reworking or renovating it.

3. If they pass, other GM divisions are advised that it's available through a corporate clearing house system.

4. If there still are no takers, and depending on its value, the material or equipment is broken up for scrap or listed on "proposal of sale" forms which are sent to firms that usually bid on the various items.

Know Your Buyers

"Fisher's aim is to get rid of surplus materials as quickly as possible," says Mr. Dreher. It usually does so within a month and often within a week or ten days. GM policy requires at least three bids be submitted on any goods. The division constantly revises its lists of regular bidders. Financial standing and frequency of bids are among the qualifying requirements.

Used machinery dealers usually buy capital equipment like presses, lathes, and boring mills. Sometimes a manufacturer learns of a specific piece of equipment and bids for it.

Supply and expense items like obsolete drills, surplus welding parts, pipe fittings, and grinding discs generally are bought by mill supply houses. In many cases, the vender or original manufacturer will buy back unused materials. Salvage officers in Fisher's various plants try that approach first. They're authorized to accept 85 per cent or more of the original price. If they have no luck they report the items on IMR forms and Mr. Dreher's office sells the materials.

Raw materials like coil dropoffs (edges left over from slitting) usually are sold to steel warehouses for 2 to 4 cents a pound above their scrap value if they can't be used to make other parts for the division. Producers of novelty goods are major buyers of trim roll goods (vinyl and fabric) which either are surplus or made obsolete by running changes.

Mr. Dreher points out that production parts that can't be reworked or held for service are never sold outside unless they're mutilated beyond repair. In that case, they're sold as scrap. That's to avoid the possibility of some auto supply firm getting reject or obsolete doors or deck lids and palming them off as "factory new" parts.

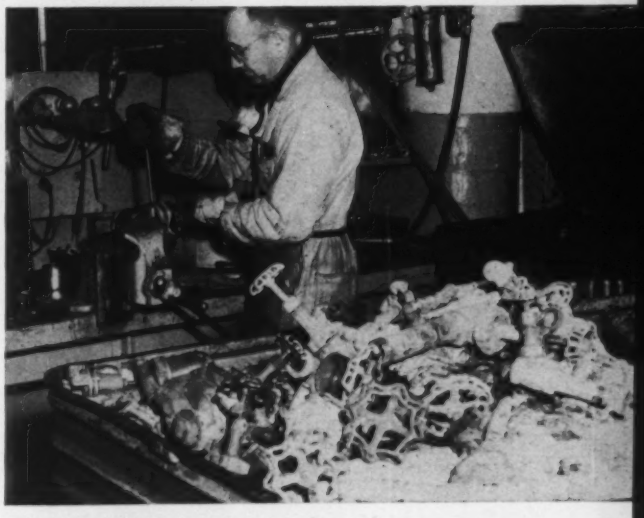
Venders report surplus parts on statement of cancellation charge forms so they can be reimbursed. The forms list raw materials, work in process, and finished parts. Fisher Body checks all claims of $1000 and over, says Mr. Dreher. Production tooling, dies, jigs, and fixtures in vender plants usually become obsolete at the end of each model run. Mr. Dreher's office checks with divisional engineering and service sections to see which tooling will be needed for future models or for replacement parts. The salvage department then authorizes scrapping of all tools except one set for each part that's held for service. Purchasing picks the venders who will keep those tools and furnish the replacement parts.

Sell Scrap on Bid Basis

Scrap steel is one of the division's most rapidly accumulated commodities. Because it's expensive to store, Fisher Body solicits bids at the end of one month on baled scrap it estimates it will generate in the ensuing month. A 10 per cent clause in sale contracts protects purchasers from having to take more than 110 per cent of the estimated amount of scrap. It also insures them of getting at least 90 per cent at their quoted price even if it has to be made up in the following month's shipments.

Fisher Body produces 40 per cent of all the steel scrap

USED equipment dealers buy obsolete presses



PIPE FITTINGS can be used again

BALED SCRAP is sold by competitive bids

GM turns out, more than 1 million tons a year during normal production. For example, it has already contracted to deliver 58,600 gross tons of industrial bundles and bushseling this month. About 40 tons of scrap constitute a carload.

Miscellaneous unprepared scrap, borings and turnings, galvanized clippings, and small lots of heavy melting steel are sold and shipped on a truckload basis every two months, says Mr. Dreher. Solder dross, zinc sludge, and aluminum clippings are sold at one to three month intervals. Other nonferrous scrap is reported as it's accumulated and is sold within ten days. Although some companies sell scrap on a contract basis at prices based on published quotations (STEEL carries such prices weekly), Mr. Dreher has found that for the quantities of scrap Fisher generates, competitive bids result in higher prices.

Paper is another lucrative scrap item, bringing from $8 to $20 a ton, depending on grade and location of sale. It's usually divided into mixed and corrugated grades, although a few of the plants sort out a premium kraft grade. Four Fisher facilities have installed paper shredders which process and bale the paper more quickly and economically than bulk baling methods.

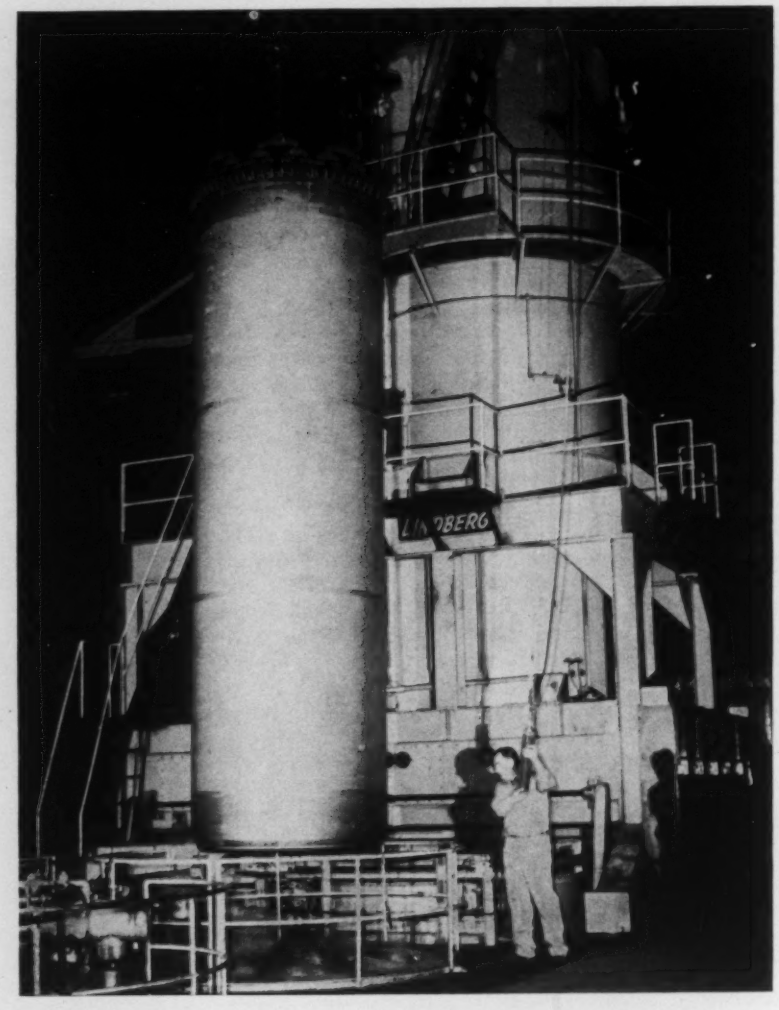
Seek New Salvage Markets

As materials used in body building change, salvage people must find new uses and new outlets for the scrap. Sometimes it takes a while to find a market, but Mr. Dreher cautions patience and perseverence. He points to the zinc sludge the division generated when it started spraying Corvair bodies with zinc rich primer. The sludge had no immediate sales value, but the division saved it and soon found buyers who paid up to 1 cent a pound for it. Now the sludge is selling for 2.5 to 3 cents a pound as purchasers discover still more uses.

A vinyl sludge results from a newly developed process of spraying vinyl on metal. Says Mr. Dreher: "We haven't found any buyers (for the vinyl sludge) yet, but I know that we will eventually." Rather than paying to haul it to the dump, Fisher would consider a bid of even a fraction of a cent a pound.

Re-using supply items is another method that saves hundreds of thousands of dollars each year, reports Mr. Dreher. Example: Corrugated cardboard separators that protect body stampings during shipments. They formerly were discarded. Now, each separator is marked with the name of the shipping plant so it can be put in a bundle and returned for re-use. Bundling costs an average of 15 cents a pound, a net saving of 8 cents a pound over the cost of throwing them away.

Wooden containers for glass, are sold back to the vender at part cost. Drums, buckets, and other types of containers have found ready markets. Canvas work gloves are cleaned and used again. Asserts Mr. Dreher: "A use or a market can be found for almost every commodity in your plant if you're willing to take the time and effort to seek it out. That's how you can turn salvage disposal into a profitmaking operation."



Furnace Purges Minuteman Motor Case

A FIRST STAGE Minuteman motor case is being lowered into the purging station of an eight story, electric gantry furnace at Lindberg Steel Treating Co., Chicago. The chamber will purge all air and substitute an inert nitrogen atmosphere prior to raising the case into the tower (at the rear) for heat treatment. The setup includes a salt quench tank and a water wash tank. Design and construction took four months and cost nearly $1 million.

Pre-Engineering by **KAISER ENGINEERS** answers basic plant expansion questions...

Raw Materials?

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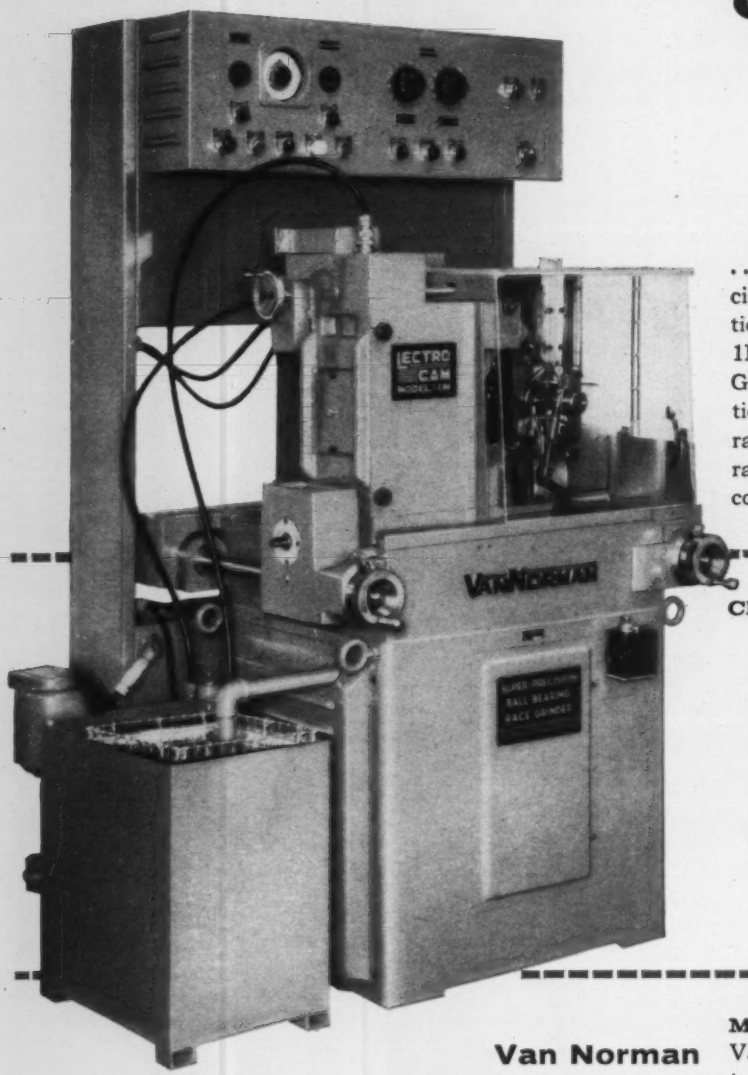

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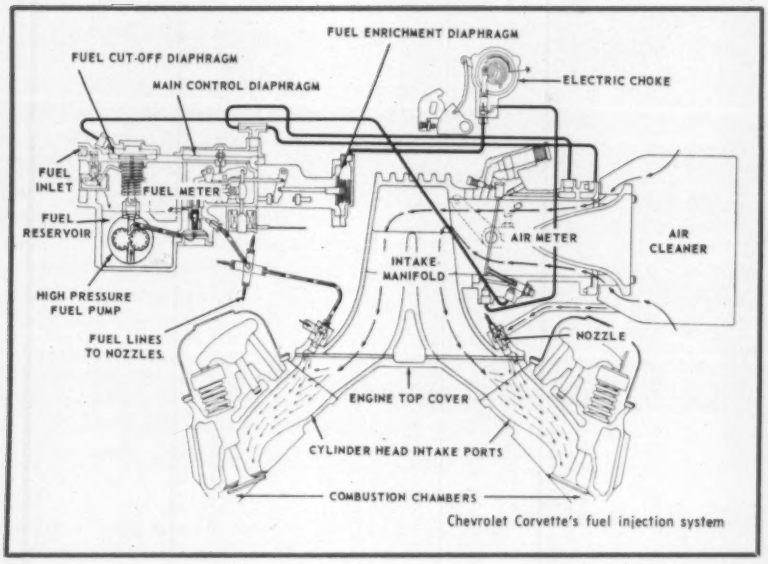

Chevrolet Corvette's fuel injection system

Rising fuel costs plus redesigned systems is why . .

Fuel Injection Talk Revived

LOOK FOR several makers of heavy duty trucks to offer fuel injection on gasoline engines in 1963. It's even possible that one car division will reintroduce it to car buyers for less than $100 on standard lines. Chevrolet's Corvette is the only Detroit product that still offers injectors. Cost is $484 and the division reports they're being installed on 15 per cent of the model run.

Economy is the chief reason for the revival of interest in FI. Injection can offer from 10 to 15 per cent improvement in fuel consumption. That factor was virtually ignored during the 1955-57 horsepower race when injectors were touted for their high speed performance characteristics. Cost has been the biggest stumbling block for injection systems. They've been priced between $400 and $500, two to five times more than carburetors. But several things have happened in the last two years that puts FI back in the picture—especially for trucks.

1. Diesel fuel prices are rising as aircraft and other vehicles demand greater quantities of higher viscosity fuels. They're already equal to or higher than gasoline prices in many parts of the country. Fuel costs will jump even more if President Kennedy wins all or part of his proposal to boost taxes on diesel fuel as much as 7 cents a gallon. That will wipe out any fuel economy gains diesels now have over gasoline engines.

2. Gasoline taxes keep climbing too. The most conservative projections show the cost for bulk users will rise at least 1 cent a gallon by 1962.

3. Before most fuel injectors were put on the shelf, several manufacturers had redesigned their system to a point where unit costs were considerably lower—even with limited volume. Ben Parsons, president, Fuelcharger Corp., Detroit, claims the latest redesign of his simplified, constant flow injector can be produced at less than $20 in 2000 unit lots. Another maker reportedly has a more complicated timed system that can be built for $35 in quantities under 12,000 units.

• **Trucks Hot**—In the last six months, interest in fuel injection has blossomed to the stage where engineers are starting to sell top brass on the idea that the economy pitch makes good sense for trucks. Asserts Murray Kennedy, engine engineer, GMC Truck & Coach Div., Pontiac, Mich: "I want it for our larger truck engines because I believe it makes for definite savings. I'm prepared to prove we can get at least a 10 per cent improvement in tank mileage. That means we can afford to pay more for fuel injection than for carburetor systems." One of the independent truck builders tells STEEL: "We're planning extensive highway tests next year. If they're successful we hope to offer injection in 1963."

Truck builders are talking that kind of economics to substantiate their claims for FI. Suppose you put 60,000 miles a year on a heavy duty truck and average 4 mpg. An injection system will boost economy to 4.5 mpg. At a typical bulk fuel rate of 25 cents a gallon, you'll save $416. Recent studies by one systems manufacturer show there's a potential 100,000 unit annual market in gasoline engine powered trucks covering 60,000 to 100,000 miles a year. That makes the idea of plunking from $2 million to $12 million into precision grinding, turning equipment, and other tooling look more attractive to FI suppliers. That's particularly true if the precision built injectors can be made more reliably than carburetors.

• **Autos Dubious**—The story is different for passenger cars. Reports A. E. Cleveland, manager of Ford engineering staff's Reciprocating Engine Dept.: "The customer should be able to recover the cost of a fuel injection system in 40,000 miles of driving."

Comments James Yingst, manager of automotive development for

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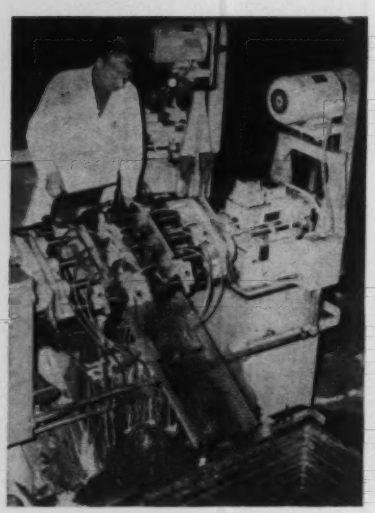
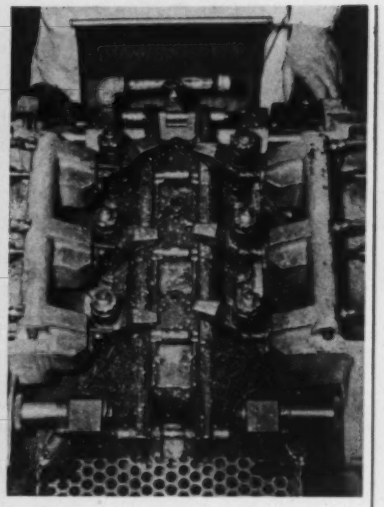




Hinge Pins Drilled Three at a Time

AN OPPOSED HEAD, horizontal machine has been developed that drills, reams, and chamfers hinge pin holes on 20 different types of automobile door hinges a third faster and at half the cost of doing them in a rotary index machine. Production is 800 parts an hour compared with 500 on older equipment. Changeover time from one style part to another: 1 hour vs. 3.5 hours.

The equipment cost $20,000. It was designed and developed by R. J. Carter, plant manager, Soss Mfg. Co., Detroit. Machines are built up on fabricated bases and use standard drill heads with self-contained hydraulic units. They're run in pairs so one operator can feed two machines. The equipment will machine both male and female hinge sections. It works equally well on stamped or cast hinges.

The operator places three hinges on locating pins in the machining fixture. They're clamped hydraulically, drilled from one side, then reamed and chamfered from the other with a single tool. Parts are unclamped automatically and ejected. They slide down the fixturing shoot into a work basket. The machine went into operation early this year. Mr. Carter says Soss is building up several more units for next year's production.

Thompson Ramo Wooldridge's Cleveland automotive group: "Any further work on our system has been delayed until we get some indication of genuine need and real interest from the industry."

Adds Frank Pilling, sales vice president, Marvel-Schebler Div., Decatur, Ill., Borg-Warner Corp.: "There is development work going on in engines that by necessity will demand fuel injection, but I don't know whether it will take two or ten years." M-S recently set up major development facilities for its redesigned timed system at Decatur. Industry talk has it that the system is the least expensive on the market. Simmonds Precision Products Co., Tarrytown, N. Y., still is eying the automotive field. Simmonds has built 20,000 of its timed systems for military vehicles and light aircraft in the last five years so it has some tooling and some production experience. American Bosch Div., Springfield, Mass., American Bosch Arma Corp., and Bendix Corp., Detroit, appear less interested in auto injectors. Carter Carburetor Div., St. Louis, ACF Industries Inc., and Holley Carburetor Co., Warren, Mich., are putting stress on carburetors.

If fuel injection does reappear on passenger cars, look for it first at Chevrolet. GM's Rochester Products Div. makes the Corvette units, but suppliers say Chevy has been looking at other systems too.

• **Which Type?** — Although most venders still seem to prefer timed injection in which each charge of fuel is metered into the cylinders, Fuelcharger's Mr. Parsons continues to tout the constant flow theory which depends on pressure pumps to shoot gas vapor into the cylinders. Operation largely is controlled by engine speed and manifold vacuum. Constant flow units are simpler and less costly, but other manufacturers charge they don't work too efficiently at low speeds. Mr. Parsons disagrees. He argues: "Even timed injection becomes continuous flow over 1600 rpm because the timing won't keep up with the rapid rate of operation. Not only that, it becomes a variable rate flow and that makes it little better than a carburetor so far as economy's concerned!"

States GMC Truck's Mr. Kennedy: "I have no preconceived opinions on which type is best. What I want is a system that will give us better tank mileage at a reasonable cost."

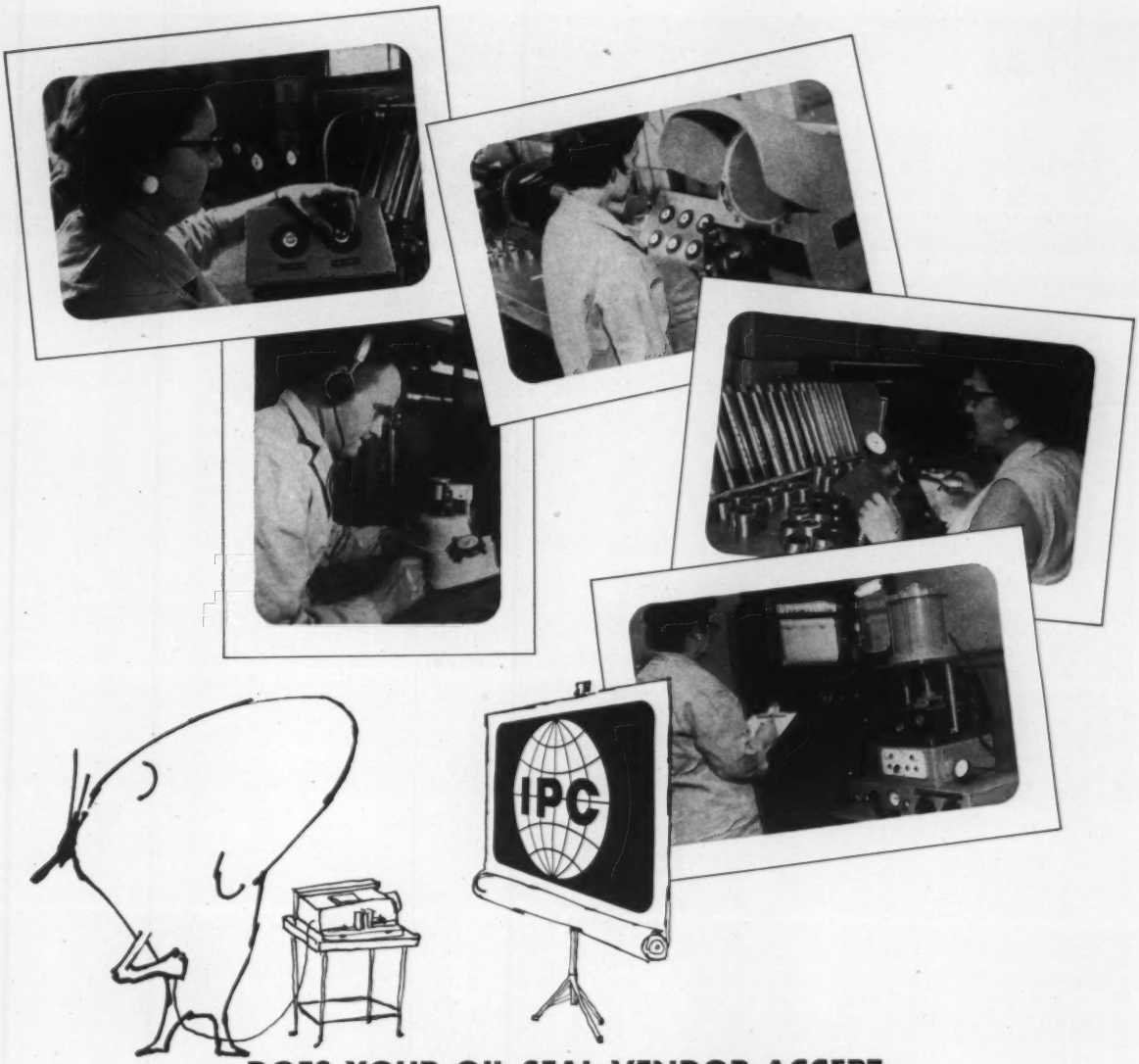
U. S. Auto Output

Passenger Only

	1961	1960
January	415,857	688,690
February	364,385	659,298
March	407,959	654,242
April	446,740	582,909
4 Mo. Totals	1,634,941	2,585,139
May		611,226
June		613,147
July		434,377
August		305,527
September		407,685
October		617,816
November		597,132
December		522,239
Total		6,694,288

Week Ended	1961	1960
Apr. 8	93,730	133,460
Apr. 15	114,108	135,412
Apr. 22	124,459	144,886
Apr. 29	114,378	135,515
May 6	126,128†	142,091
May 13	125,000*	145,917

Source: *Ward's Automotive Reports.* †Preliminary. *Estimated by STEEL.



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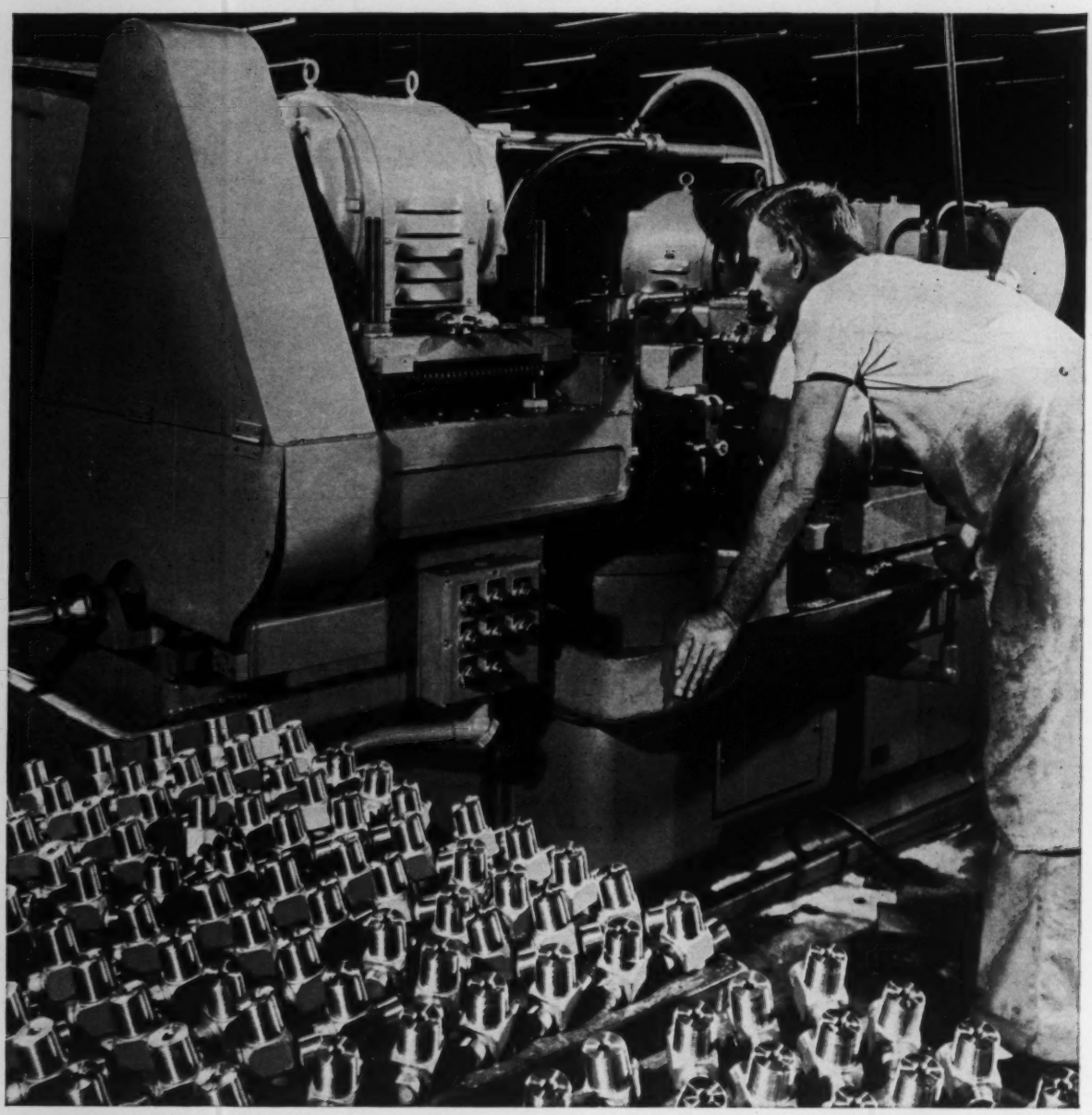

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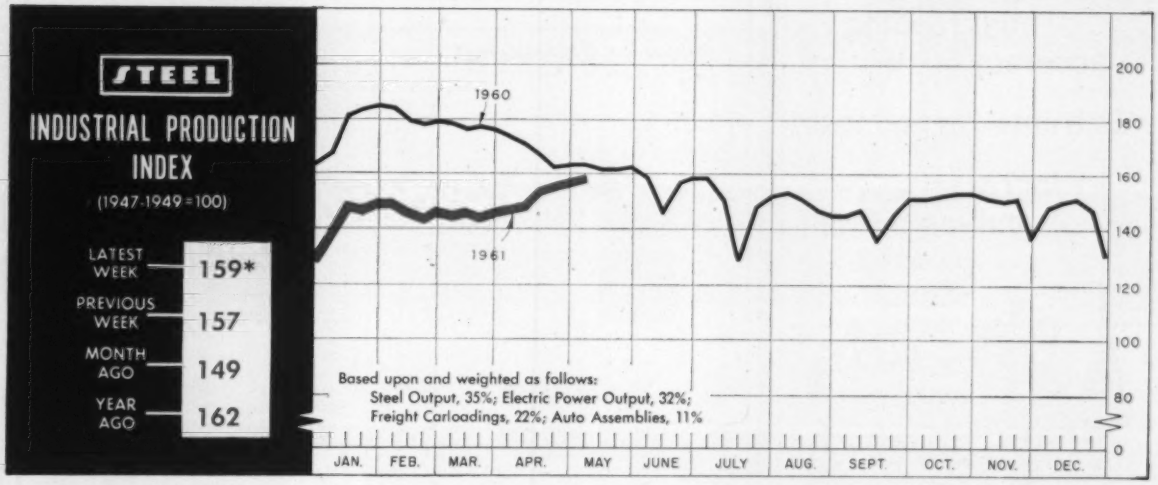

*Week ended May 6.

Economic Recovery Has Broad Base

MAY DATA are reconfirming the business pickup which began in earnest last month. Another 2 points added to STEEL's industrial production index brings the trend line to a preliminary 159 (1947-49=100) in the week ended May 6, only 3 points shy of the year-ago mark.

• **Big Guns**—The trend leaders are still the steel and automotive industries, both of which reached their 1961 high points in the latest week of record. Output from the nation's steel mills in the week ended May 6 jumped to 1,943,000 net tons of ingots, the best since the middle of May, 1960. The gain of 85,000 tons from the previous week also was the biggest in a skein of advances dating back to early March. STEEL estimates that production hit at least 2 million tons in the week ended May 13.

Automakers are responding to firmer sales by posting firmer schedules. Production of cars and trucks in the first week of May hit the highest level since the week ended Dec. 17, and Detroit observers believe output will hover around that level throughout May and June.

• **Major Assists** — In addition, a small upturn in freight carloadings is beginning to erase doubts about the validity of the upturn. Officials of the Chesapeake & Ohio Railway reported loadings in April were 9 per cent over those of March. Harry C. Murphy, president of the Chicago, Burlington & Quincy Railroad, predicts improved operations this quarter, based on a good grain crop, increased construction activity, and an expected general economic improvement.

Not to be overlooked: Electricity is holding fairly level at a time when it usually is in a sharp seasonal decline.

• **How Broad?**—During this stage of almost every recession, one of the big questions is: How broad is the base for the improvement? The an-

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)	2,000[1]	1,943	2,102
Electric Power Distributed (million kw-hr)	14,200[1]	14,254	13,139
Bituminous Coal Output (1000 tons)	7,420[1]	7,405	8,367
Crude Oil Production (daily avg—1000 bbl)	7,000[1]	7,249	6,771
Construction Volume (*ENR*—millions)	$418.8	$555.0	$530.4
Auto, Truck Output—U. S., Canada (*Ward's*)	159,315[1]	147,996	181,626
TRADE			
Freight Carloadings (1000 cars)	550[1]	544	642
Intercity Truck Tonnage (changes from year ago)	−2.7%	−1.1%	−2.4%
Business Failures (Dun & Bradstreet)	369	320	325
Currency in Circulation (millions)[2]	$31,843	$31,807	$31,603
Dept. Store Sales (changes from year ago)[2]	−3%	−1%	+7%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$32,853	$28,625	$29,905
Federal Gross Debt (billions)	$288.0	$288.6	$288.8
Bond Volume, NYSE (millions)	$33 1	$31.7	$24.3
Stocks Sales, NYSE (thousands of shares)	23,066	22,401	13,956
Loans & Investments (billions, adjusted)[3]	$109.7	$109.7	$103.1
U. S. Govt. Obligations Held (billions)[3]	$30.0	$30.0	$26.0
PRICES			
STEEL's Finished Steel Price Index[4]	247.82	247.82	247.82
STEEL's Nonferrous Metal Price Index[5]	218.7	215.1	230.7
All Commodities[6]	119.3	119.4	119.8
Commodities Other than Farm & Foods[6]	128 0	128.1	128.4

*Dates on request. [1]Preliminary. [2]Federal Reserve Board. [3]Member Banks, Federal Reserve System. [4]1935-39=100. [5]1936-39=100. [6]Bureau of Labor Statistics Index, 1947-49=100.

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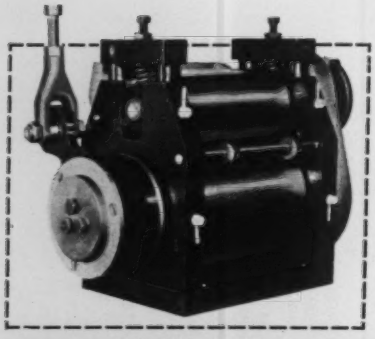

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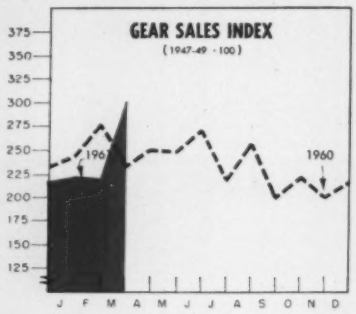
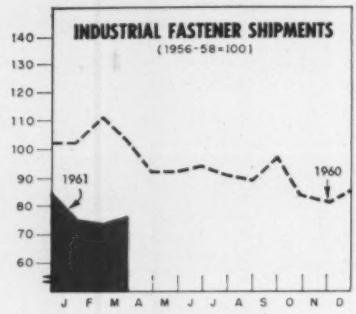
THE BUSINESS TREND





	Bookings 1961	Bookings 1960	Shipments 1961	Shipments 1960
Jan.	220.8	243.4	227.3	207.3
Feb.	218.3	278.6	214.4	230.2
Mar.	299.3	231.8	246.8	244.6
Apr.	....	249.2	....	234.8
May	....	246.9	....	241.3
June	....	269.8	....	253.6
July	....	217.5	....	210.8
Aug.	....	255.8	....	217.3
Sept.	....	197.9	....	223.5
Oct.	....	219.9	....	220.6
Nov.	....	198.9	....	226.7
Dec.	....	216.5	....	220.0
Avg	....	235.5	....	227.6

American Gear Mfrs. Assn.
Charts copyright, 1961, STEEL.

(Seasonally adjusted)

	1961	1960	1959	1958*
Jan.	75	102	99	133
Feb.	74	111	105	117
Mar.	76	103	105	103
Apr.	....	92	119	102
May	....	92	119	111
June	....	94	129	120
July	....	91	112	133
Aug.	....	89	77	120
Sept.	....	97	92	141
Oct.	....	83	83	137
Nov.	....	81	80	134
Dec.	....	85	102	152
Avg	....	94	101	125

*1947-49=100.
Industrial Fasteners Institute.

swer in 1961: From coast to coast. But it's almost axiomatic that those areas which had the deepest recession are also having the strongest recovery.

Take Pittsburgh, for example. Largely because of the comeback in steel, its business activity has jumped over 10 per cent in the last two weeks and is at the highest point since early last June, reports the Bureau of Business Research at the University of Pittsburgh. Business is also feeling the impact of the steel industry in the South, where one producer reports the best April in several years.

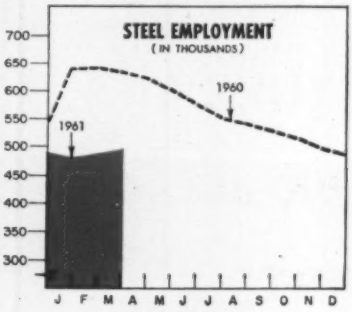
Or take two cities commonly linked by geographic ties but whose economies differ to a marked degree —Dayton and Cincinnati, Ohio. Dayton is tied to consumer durables —autos and appliances. When both of those markets slumped, unemployment moved the area into the "depressed" category. Not even the marked stability of National Cash Register Co., probably the city's largest single employer, or the near record business of some of the smaller manufacturers, could overcome the deficit.

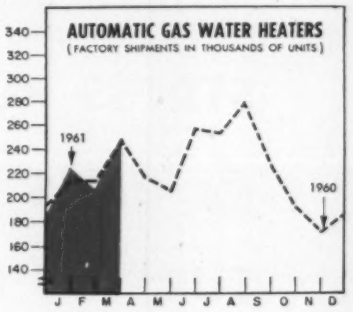
It took a turnaround in autos and appliances last month to make any appreciable improvement in business conditions. "Give me 30 days of sunshine, and I'll be better able to tell you how much of a recovery we will have," I. H. Jones, chairman of Winters National Bank & Trust Co., told STEEL. "If consumers get back to work and start spending more money, we'll have a good surge in the fourth quarter."

• **Depends on Mix**—Just an hour's drive down the pike, Cincinnati is rolling along at the fairly good clip it has maintained right through the recession. Reason: It is less heavily dependent on hard goods than its neighbor. Termed by many of its businessmen as a "conservative stronghold," Cincinnati has a wide variety of nondurable and service industries, which have not been hit too hard by recessions in recent years.

Even the machine tool industry has more of a psychological than a real effect on the area's business activity, some business leaders claim. Concentration of the industry in the Queen City may be great, but its employment is a relatively small percentage of the total.

In addition, when machine tool orders are low, the industry usually cuts the workweek first. (One Cincinnati builder claims it has not





	Employment In Thousands 1961	1960	Payroll In Millions 1961	1960
Jan.	478	641	$274.9	$398.8
Feb.	484	643	267.1	381.4
Mar.	492	637	298.1	398.8
Apr.	...	628	....	357.2
May	...	604	....	339.8
June	...	580	....	316.0
July	...	554	....	287.0
Aug.	...	543	....	300.3
Sept.	...	531	....	287.2
Oct.	...	516	....	284.8
Nov.	...	499	....	270.4
Dec.	...	486	....	267.9

American Iron & Steel Institute.

	Shipments—Units 1961	1960	1959
Jan.	226,100	215,500	266,200
Feb.	206,700*	214,800	259,700
Mar.	249,400*	247,300	285,900
Apr.	.....	216,200	261,300
May	.....	205,500	239,300
June	.....	256,000	250,000
July	.....	254,100	245,100
Aug.	.....	279,400	256,100
Sept.	.....	227,600	243,800
Oct.	.....	192,900	274,200
Nov.	.....	171,400	199,100
Dec.	.....	185,500	192,900
Totals	.....	2,666,200	2,953,600

*Preliminary.
Gas Appliance Mfrs. Assn.

dipped below a 40 hour week in the postwar period.) Then, if necessary, whitecollar or unskilled workers are laid off. Only in a dire emergency will builders lay off their skilled help.

• **Growth Helps**—In some of the nation's fastest growth areas, the recovery is hardly noticeable because the recession was so shallow and short-lived. Evidence: The business index of the Valley National Bank of Phoenix, Ariz., had already reached a new peak of 240.1 (1947-49 = 100) in February—the low point of the recession for the nation as a whole. In Southern California, the business activity index of the Security First National Bank, Los Angeles, posted a record 218.6 (1947-49 = 100) in March.

• **Buyers Optimistic**—Further evidence that the recovery is broadly based is the substantial improvement in the April report of the business survey committee of the National Association of Purchasing Agents. Fifty-eight per cent of the responding members reported an improvement in new orders, the best showing in over 5½ years. And only 9 per cent reported a softening in new orders, the lowest percentage since May, 1959. Production is keeping up with new orders, NAPA reports.

• **Industries Too**—Many industries are contributing to the increase in activity. One of the most significant is the 37 per cent jump in new orders reported by gearmakers in March. (See graph and table, Page 78.) The index reading of 299.3 (1947-49 = 100) comes within 0.5 point of eclipsing the record set in October, 1956. This industry is considered by many businessmen as one of the most sensitive barometers. (On the other hand, orders for industrial fasteners, another widely used component charted on Page 78, are showing no signs of recovery.)

Appliance makers are fairly certain things are getting better, judging from the number of employment recalls in the last few weeks. Makers of room air conditioners in the first three months of 1961 reported factory sales of 528,600 units compared with 441,500 in the corresponding period of last year.

The report of the Metal Treating Institute indicates its members may have reversed the trend in March by booking nearly $3.4 million of new business, up from February's billings of just under $3.0 million.

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The Midvac Process of consumable electrode melting eliminates atmospheric contamination, ingot soundness is improved, segregation is reduced, workability is increased and product quality is stepped-up. Midvac Steels are offered in many alloys as billets or forgings to meet the most critical design specifications of jet engine parts, missile and aircraft components and other products requiring properties beyond the capabilities of conventional steels. Let M-H metallurgists help you select the right alloy to meet your product's specifications. Write . . .

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VACUUM AND CONSUMABLE ELECTRODE STEELS • BACK-UP ROLL SLEEVES • FORGED STEEL ROLLS • FORGINGS
RINGS • PRESSURE VESSELS • INDUSTRIAL KNIVES • DIE BLOCKS • MATERIALS HANDLING EQUIPMENT

WALTER E. SCHIRMER
Clark Equipment exec. v. p.

EVEN T. COLLINSWORTH JR.
Fansteel president

LOREN K. HUTCHINSON
Wyman-Gordon promotion

STEWART S. CORT
Bethlehem-Pacific Coast v. p.

Walter E. Schirmer was elected executive vice president, **Clark Equipment Co.**, Buchanan, Mich. He was vice president, and in addition served as president of Clark Equipment International C. A. since 1958.

Even T. Collinsworth Jr. was elected president and chief administrative officer of **Fansteel Metallurgical Corp.**, North Chicago, Ill. He succeeds **Dr. Frank H. Driggs**, elected chairman. Mr. Collinsworth was elected executive vice president of Fansteel and its subsidiaries when he joined the company last August. He also serves as president of Vascoloy-Ramet Corp., Waukegon, Ill., and of the newly acquired Wesson Corp., Detroit, divisions of Fansteel.

John V. Patton was named plant manager and director of purchases, **W. W. Sly Mfg. Co.**, Cleveland. **Howard Ash** succeeds Mr. Patton as purchasing agent.

Wyman-Gordon Co., Worcester, Mass., promoted **Loren K. Hutchinson** manager of operations, Eastern Div., responsible for manufacturing, product engineering, and estimating for the Worcester plant and the USAF-leased plant at North Grafton, Mass. He was works manager at the Worcester plant. **Arthur H. Swift** was made director of plant and equipment engineering for the division. In other promotions affecting both plants, **H. K. Sampson** was made manager of production development; **O. Frank Burbank** manager-product engineering and estimating; **W. J. Barlow** supervisor of estimating. **Robert A. Eddy** was made manager of the Worcester plant.

Andrew E. O'Leary was elected a vice president, **American Machine & Foundry Co.**, New York.

John R. Hibler was elected president, **Towne Robinson Nut Co.**, Dearborn, Mich.

Stewart S. Cort was elected vice president, **Bethlehem Steel Co.**, in charge of the Pacific Coast Div., San Francisco. He succeeds the late **H. Harrison Fuller.** Since 1960, Mr. Cort has been an assistant general manager of sales in the general offices, Bethlehem, Pa. He formerly was in charge of sales on the Pacific Coast.

Camloc Fastener Corp., Paramus, N. J., elected **T. A. Barkauskas** vice president-production, and **J. R. Newcomer** vice president-engineering.

M. C. Sarnes was appointed general manager, **Haller Inc.**, Northville, Mich. He resigned as manager of Allied Products Corp.'s precision parts plant at Hillsdale, Mich.

Roy W. Clansky Jr., former executive vice president, was elected president, **Standard Forgings Corp.**, Chicago. He succeeds his father, **Roy W. Clansky**, who fills the new post of chairman. **Albert M. Olson** was

JOHN V. PATTON
W. W. Sly Mfg. posts

JOHN R. HIBLER
Towne Robinson Nut pres.

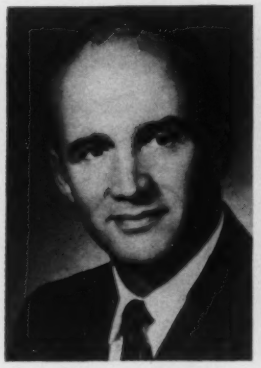
M. C. SARNES
Haller gen. mgr.

ROY W. CLANSKY JR.
Standard Forgings president

CHARLES H. PERCY

PETER G. PETERSON

Bell & Howell chairman and president



STANLEY J. GILLEN

C. WILLIAM CONN

division gen. mgrs. at Ford

elected executive vice president and secretary, **K. E. Cramer** treasurer.

Charles H. Percy was elected chairman and chief executive officer, and **Peter G. Peterson** president of **Bell & Howell Co.**, Chicago. **Robert H. Garretson** was elected executive vice president; **Dr. Charles F. Robinson** vice president-research; **Alfred T. Craft** vice president, Business Machines Div. **William E. Roberts** resigns, effective Aug. 1, as executive vice president, and serves until then as special assistant to the chairman. **Philip S. Fogg** was elected vice chairman; **Theodore V. Houser** chairman of the executive committee. Earlier, Mr. Fogg was made chairman and chief executive officer; and Mr. Garretson president of Consolidated Electrodynamics Corp., B&H subsidiary in Pasadena, Calif.

Colorado Fuel & Iron Corp., Denver, elected **Leonard C. Rose** executive vice president, and **Rudolph Smith** executive vice president-operations. Mr. Rose was director of purchases. Mr. Smith was works manager, Pueblo, Colo., plant.

W. T. Ylvisaker, former president of Parker-Kalon Div., **General American Transportation Corp.**, Chicago, was elected executive assistant to the president of the parent company. **J. R. Scanlin** was elected vice president.

T. F. Bell was elected president, **Interlake Iron Corp.**, Cleveland. He succeeds **Ronald W. Thompson**, elected chairman to succeed **Gen. William M. Hoge,** retired, but continuing as consultant. **J. Lindsay Johnson** and **John B. Hazle** were made vice presidents.

Kenneth C. Harris was made manager-marketing research, **Denison Engineering Div.**, Columbus, Ohio, American Brake Shoe Co.

Cone Automatic Machine Co. Inc., Windsor, Vt., appointed **J. Arnold Kiely** executive vice president; **Robert R. Rhodehamel** vice president-manufacturing.

Stanley J. Gillen was appointed general manager, Hardware & Accessories Div., **Ford Motor Co.**, Dearborn, Mich. **C. William Conn** was appointed general manager, Steel Div., succeeding Mr. Gillen, who replaces **John S. French,** recently named general manager of Ford's new Motorcraft Div.

Edward J. Flickinger was elected a vice president, **Indiana Cap & Set Screw Co.**, Franklin Park, Ill.

David H. Baker was elected a vice president of **Vickers Inc.**, Detroit, division of Sperry Rand Corp., and general manager of its International Div. He succeeds **R. E. Esch,** retired. Mr. Baker was president of Capital Airlines Inc. Mr. Esch remains as vice president and consultant.

Charles R. Wentz was named manager of **Reynolds Metals Co.'s** new plant in Chester, Pa., which will produce insulated wire and cable for the electrical conductor market.

Earl R. Feine was appointed vice

LEONARD C. ROSE

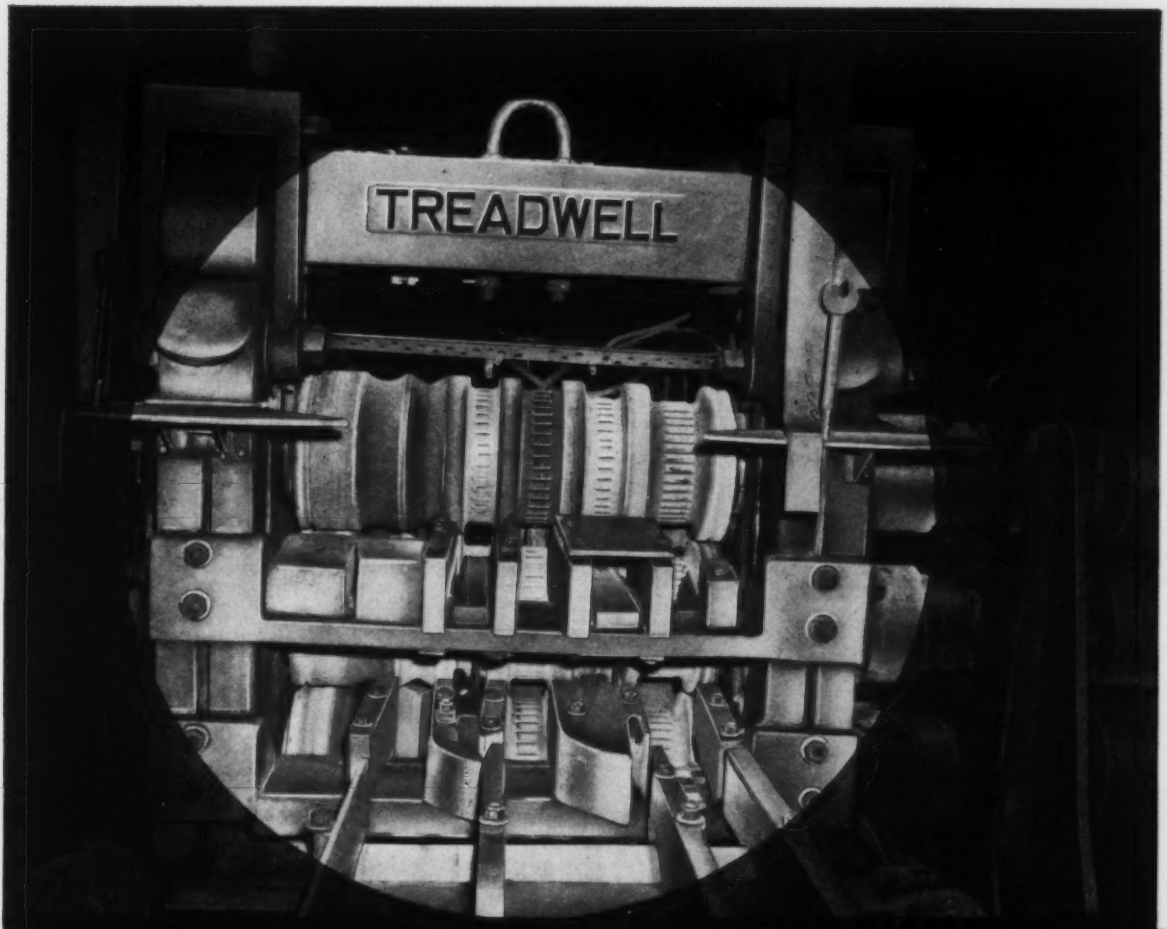
RUDOLPH SMITH

CF&I executive vice presidents

J. ARNOLD KIELY

ROBERT R. RHODEHAMEL

Cone Automatic Machine executives



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SAVES TIME, MONEY AND MAINTENANCE

Furnace side view of 21-inch 3-high merchant mill stand. Entry and delivery guides designed by TREADWELL. Cast of ductile iron in the TREADWELL foundry. Tilting tables supplied by TREADWELL, too. Designed, built and delivered on schedule by TREADWELL. We will do the same for you. See our equipment specialties listed below.

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Manipulators, Mill, etc.
Mills, Billet, Merchant & Bar
Mills, Rod
Mills, Vertical Edging
Mill Repeaters
Coilers & Reels
Tables, Mill
Tables, Tilting & Lift
Tables, Transfer
Transfers
Conveyors, Coil
Drivers & Pinions
Ejectors, Furnace
Gauges, Shear, Saw, etc.
Beds, Coping
Beds, Inspection
Bumpers, Furnace
Pushers, Furnace
Handling Equipment (Kick-offs, Pilers, Cradles, etc.)

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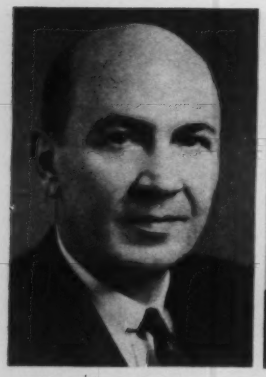
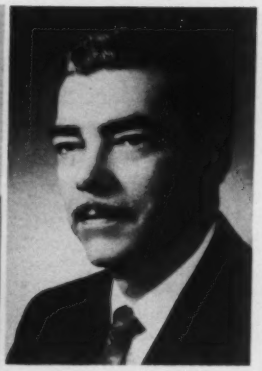
CASTINGS — Electric Furnace Steel, Ductile Iron, Gray Iron and Ni-Hard

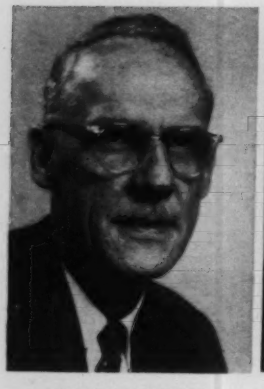


THEODORE A. STRAUB JR.
Fort Pitt Bridge president

T. S. TORIAN
Bendix Mishawaka post



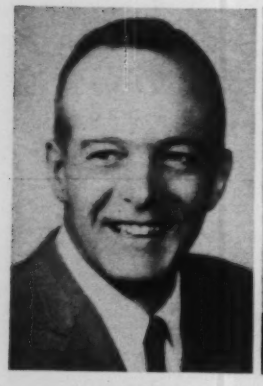
THOMAS G. CONWAY
Bower Roller Bearing mgr.



GEORGE H. MILLER
Scott & Williams exec. v. p.

LEN CONRAD
Heil-Quaker v. p.-gen. mgr.

FRANK M. CASHIN
heads Kaiser-Refractories



L. G. ENROTH
Famco gen. sales mgr.

EDWARD H. RICHARD
Ohio Electric magnetic sales

NORMAN H. SCHLINK
Scovill divisional v. p.

president and sales director, **Electric Autolite Co.**, Toledo, Ohio.

L. G. Enroth was appointed general sales manager; **C. George Mattusch** assistant sales manager at **Famco Machine Co.**, Kenosha, Wis.

Norman A. Greig was made general manager, **Centre Foundry & Machine Co.**, Wheeling, W. Va.

Edward H. Richard was made sales manager-magnetics, **Ohio Electric Mfg. Co.**, Cleveland, subsidiary of Howell Electric Motors Co.

Norman H. Schlink was appointed vice president-divisional operations, **Scovill Mfg. Co.**, Waterbury, Conn. He was vice president in charge of Waterbury Fabricating Divisions.

Theodore A. Straub Jr. was elected president, **Fort Pitt Bridge Works**, Pittsburgh, to succeed his brother, the late **James M. Straub.** He was vice president, and continues as president of Electric Welding Co., subsidiary. **Russell K. Steffey** was elected vice president.

T. S. Torian was made director of contracts and planning for **Bendix Mishawaka Div.**, Mishawaka, Ind., Bendix Corp. He was associate director, contracts and planning.

Charles W. Williams was made director of research; **Thomas G. Conway** plant manager at **Bower Roller Bearing Div.**, Detroit, Federal-Mogul-Bower Bearings Inc. Mr. Williams, former director of manufacturing at Chrysler Corp.'s advanced projects organization, succeeds **Orin W. McMullan**, named research consultant. Mr. Conway, former vice president-manufacturing of Pesco Products Div., Borg-Warner Corp., succeeds **John R. Squire**, who has been acting manager of the division's main plant since last November. Mr. Squire was named manager of manufacturing, and of manufacturing research.

George H. Miller, former vice president-manufacturing, was made executive vice president, **Scott & Williams Inc.**, Laconia, N. H.

Len Conrad was elected president, **Heil-Quaker Corp.**, Nashville, Tenn. He was executive vice president and general manager.

Frank M. Cashin, former vice president, was elected president, Refractories Div., **Kaiser Aluminum & Chemical Corp.**, Oakland, Calif. **R. A. Clayton**, vice president-treasurer, was elected president of the International Div. **A. N. Warburton Jr.** was elected vice president-controller.

OBITUARIES...

Henry J. Kaiser Jr., 44, vice president, **Kaiser Industries Corp.**, Oakland, Calif., died May 2.

Frank A. Whittall, 61, chairman and president, **Continental Can Co. of Canada Ltd.**, Montreal, Que., died May 4.

Aluminum Island.

Is this tomorrow's marina? The boat company that commissioned this Olin design thinks it's very likely. After all, new design and engineering concepts and new fabricating techniques make aluminum near limitless in application. Aluminum's inherent qualities, resistance to corrosion, lightness, natural attractiveness and strength make it a "dream medium" for designers; this marina is an excellent example. It's an on-the-spot depot for fuel, food, marine supplies – and travels from place to place under its own power. And designers who work in new concepts of aluminum have the resources of Olin Aluminum at their disposal. Our technical research and product development staff live in the world of new alloys, intricate design, fabrication, and cost and production statistics. They "think aluminum." All you have to do is think "Olin."®

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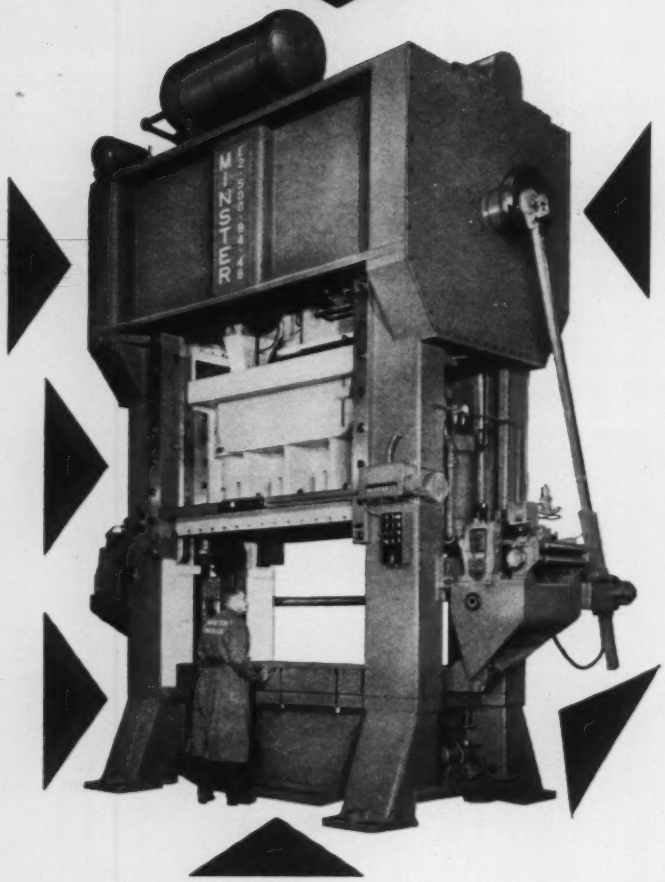
HIDDEN STRENGTHS and VALUES



There are many points of superiority in a Minster E-2 Heavy Duty Blanking and Progressive Die press . . . most of which are not immediately obvious at a glance. You might call them "hidden strengths and values." For example, the speed possibilities, the full eccentric shaft . . . the unique frame design.

If you buy with an eye to better all around performance, take a close look at the Minster E-2. 200 to 800 tons. **The Minster Machine Company, Minster, Ohio**

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Bliss & Laughlin to Build Steel Bar Plant in Ohio

BLISS & LAUGHLIN INC., Harvey, Ill., has broken ground for a $2 million cold finished steel bar plant on W. Smith Road in Medina, Ohio (near Cleveland). The new installation, seventh in the company's network, will have an annual rated capacity of about 25,000 net tons. It is slated for completion by Oct. 1 and will employ 30 people initially with an annual payroll of about $250,000.

The company now has 19 per cent of the national market for cold finished steel bars, said Fred J. Robbins, Bliss & Laughlin president. In 1950, it had 12 per cent and has shown increases every year since. With the 75,000 sq ft facility, the firm hopes to hike its portion to 21 or 22 per cent.

Mr. Robbins noted that only Michigan and Illinois outrank Ohio in consumption of cold finished steel bars (about 11 per cent of the national total). He added that steel service centers distribute almost one third of all cold finished bars sold in Ohio.

The 11 acre site in Medina offers ample room for expansion, Mr. Robbins said. He anticipates the plant will be expanded several times its original size in the next five to ten years and its production capacity could be tripled. During initial production, cold drawing equipment will finish steel bars up to 2.5 in. round and equal section.

The plant may serve customers as far south as South Carolina. Bliss & Laughlin has two sales offices in Ohio. The Cleveland office, headed by J. S. Crowell, serves the northern part of the state and the Dayton office, headed by W. V. Kuhlman, serves the southern section. Administration of the Medina installation will be the responsibility of J. Stanley McCord, vice president, Eastern Div., Buffalo.

McKay Machine Expanding

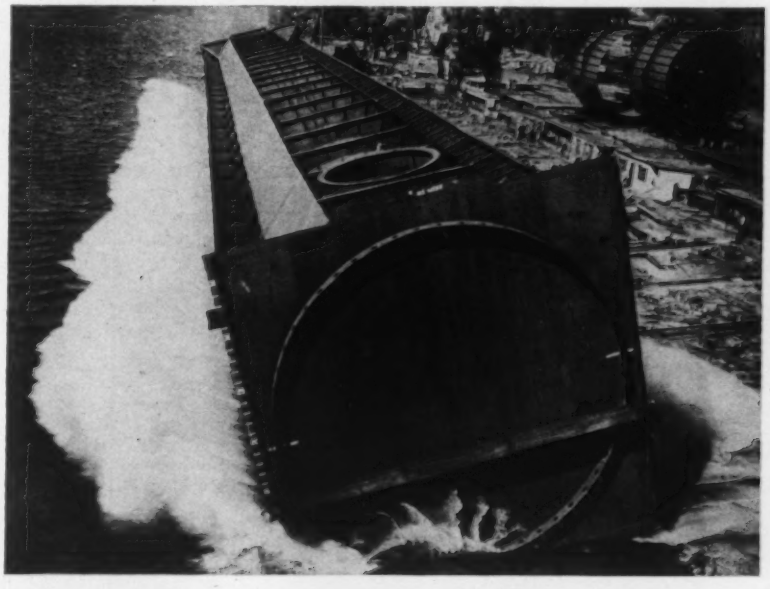
McKay Machine Co. will build a general office building and plant in Youngstown. Cost: $4.5 million, including about $1 million worth of machine tools and equipment for that plant and others. The 135,000 sq ft plant will give the firm a 40 per cent increase in space over present Youngstown facilities which will be closed.

Du Pont Starts Producing Columbium Metal Products

E. I. du Pont de Nemours & Co. Inc. Wilmington, Del., has started turning out columbium mill products commercially at its new Metals Center in Baltimore. The installation will produce columbium and columbium alloy sheets, strip, plates, bars, tubes, and other shapes. It is designed so that tantalum, tungsten, and molybdenum products can be added, says C. I. Bradford, director of metal products for the firm's Pigments Dept. The price for columbium mill products averages about $60 a pound.

CF&I Starts $15 Million Expansion of Steel Plant

Colorado Fuel & Iron Corp., Denver, has approved a $15 million program for expansion and modernization at its Pueblo, Colo., steel plant. Modernization of the plant's 25 in. mill will permit the rolling of wide flange beams in a range suited to the firm's Western market, says A. F. Franz, president. The project will also include installation of new gas cleaning equipment for four blast furnaces. Approval has also been given for the construction of a new lime burning plant and stockpiling facilities to supply lime to the



Giant Tubes Go Down to Sea

TWELVE 300 ft steel tunnel sections (one is shown) fabricated by Wiley Mfg. Co. are being "launched" at Port Deposit, Md. The sections will form a vehicular tunnel under the Elizabeth River connecting Norfolk and Portsmouth, Va. The first four of 37 similar giant casings are taking shape at the Orange, Tex., plant of U. S. Steel's American Bridge Div. They will be towed 1700 miles to the Norfolk area and sent to the bottom of Chesapeake Bay to become part of the 17½ mile bridge-tunnel between Norfolk and Cape Charles, Va., eliminating the last water barrier along the Ocean Highway.

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Take the simple, sure, direct route to lower manufacturing and maintenance cost. Design into your product Bunting Standard Stock Bearings. You avoid inventory investment, delays, confusions, production problems by the immediate availability in small or large lots, from local distributors all over America, of hundreds of different stock sizes of completely finished cast bronze and sintered bronze bearings and bars, aluminum bars and Nylon shapes.

Special design bearings not obtainable from stock can be procured immediately at low cost from Bunting fully equipped machine shops in five industrial centers. The wide range of sizes of Bunting Stock Cast Bronze and Sintered Bronze Bearings makes the alteration of a stock item to a special bearing easy and economical. Bunting Cast Bronze, Sintered Bronze, Aluminum Bars and Nylon shapes provide the materials for special requirements which cannot be made from stock bearings. Your local Bunting Distributor can arrange for such work.

A large staff of bearing engineers in the field stands ready to assist in the use of these Bunting stock products and in the designing of bearings or components for extraordinary applications. Two big, modern plants assure ample production capacity at all times for bearings and parts made from all modern metals and materials.

See Bunting's complete catalog, Sweets Product Design File 11C/BU or ask for Bunting's General Catalog, Form 158; Nylon Catalog, Form 32; Technical Handbook on Bunting Nylon, Form 33; The Technology of Bunting Aluminum, Form 46; Engineering Handbook of Powder Metallurgy, Form 1; Bunting Machine Shop Service, Form 4.

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oxygen steelmaking facility which is nearing completion. The firm has ordered additional equipment for its principal coal mines in Southern Colorado to assure adequate supply of coking coal for the Pueblo steel plant.

Castings Firm Renamed

General Steel Castings Corp., Granite City, Ill., has changed its name to General Steel Industries Inc. (GSI). In recent years the firm has acquired National Roll & Foundry Div. (iron and steel rolls), Avonmore, Pa., and St. Louis Car Co. (rapid transit and railroad cars and self-powered unit trucks for highway and delivery service), St. Louis.

GM to Buy Plant Equipment

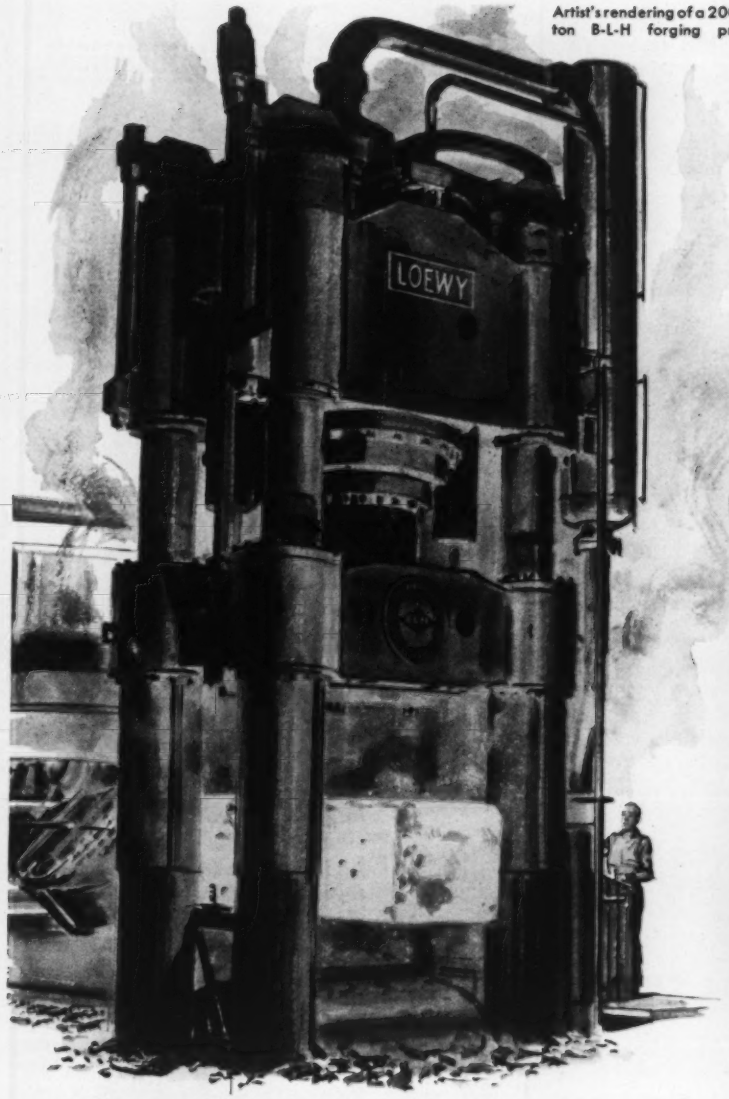
Chevrolet Motor Div., General Motors Corp., plans to spend $4.3 million in equipping and refurbishing the former aviation engine manufacturing plant in Tonawanda, N. Y. GM acquired the plant from the government last year. The expenditure—for machines, equipment, and conversion of the electrical system in the plant—will be spread out over the next five years.

Bendix Buys Foundry

Bendix Foundries, Teterboro, N. J., has purchased the land, buildings (135,000 sq ft of floor space), and certain equipment which it had previously rented from the Navy for production of a wide variety of castings. R. D. Ferguson is general manager of this unit of Bendix Corp., Detroit. The acquisition gives the company a total of 175,168 sq ft of floor space for casting production.

Equipment Going to Ruhr

Reversal of the "invasion" of U. S. industry by foreign equipment has been implemented in the placement of an order with Drever Co., Bethayres, Pa., for a continuous, wide plate, heat treating line. It will be installed at the plant of Huttenwerk Oberhausen A. G. in the Ruhr Valley, Germany. The line at Oberhausen will take plate from the firm's 160 in. mill in lengths up to 50 ft. It will be used



Artist's rendering of a 2000-ton B-L-H forging press

World's largest forging press, designed and built by B-L-H and now producing nuclear, rocket and turbine parts

From B-L-H Loewy forging presses... metallurgical excellence and optimum speed

Ideally, you want genuinely fine quality forgings and you want to make them at a high production rate. B-L-H Loewy presses meet both these requirements.

Today your customers are demanding steels free of segregation, clean and homogeneous, flawless and uniform in structure. These are precisely the steels produced on B-L-H presses, steels that possess, as one of our customers said, "internal qualities never before achieved."

Note some specific features of B-L-H forging presses:

- Fast closing, working and return speeds that reduce idle time and prevent heat loss in the workpiece
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- Heaviest eccentric loading
- Full accessibility of tooling, easy supervision and maintenance

B-L-H builds presses for free forging, open die forging, and closed die forging, for hot and cold working of all kinds of metals—ferrous and nonferrous, rare, nuclear and exotic. These machines are available in all capacities from 500 to 50,000 tons or more. B-L-H also designs and builds manipulators and accumulators. For further information, write Dept. B-5.

BALDWIN · LIMA · HAMILTON

Industrial Equipment Division · Philadelphia 42, Pa.

for normalizing, quench hardening, and the tempering of quench hardened plate.

Detroit Broach Acquires Hydraulic Control Rights

Detroit Broach & Machine Co., Rochester, Mich., has acquired exclusive licensing rights to a system of hydraulic control invented and developed by S. R. Cudnohufsky. He heads a new sales division to market a unit that makes use of the system—to convert almost any machine tool in use to a high precision, tracer machine for handling either short run or high volume production. Although the first application of the system is in the machine tool field, it holds promise for many applications in other areas, including automotive, ordnance, steel, and shipbuilding.

Westinghouse Expanding

A $2 million expansion program which will include the construction of three additions to Westinghouse Electric Corp.'s plant at Staunton, Va., will be started in July. The plant produces air conditioning equipment. The project will include the addition of about 44,000 sq ft of floor space for manufacture of heavy equipment. Areas vacated by moving heavy equipment from inside the main plant building to the new facility will be used to manufacture small hermetic compressors.

J. I. Case to Sell Plant

J. I Case Co., Racine, Wis., plans to sell its Churubusco (Ind.) plant and move manufacturing operations from that point to its Burlington (Iowa) plant. Products include front end loaders and crawler assemblies.

Plant Expansion Planned

Universal Rundle Corp., New Castle, Pa., will spend about $700,000 on a plant expansion program. A 40,000 sq ft plant addition and a tunnel kiln will increase productive capacity by 45 per cent. The company makes plumbing fixtures.

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TROY (GREEN ISLAND) N. Y.

ASSOCIATIONS

American Zinc Institute, New York, elected these officers: President, F. R. Jeffrey, National Zinc Co. Inc., New York; executive vice president and secretary, J. L. Kimberley; and treasurer, G. H. LeFevre, U. S. Smelting, Refining & Mining Co., New York. Vice presidents are: J. J. Lennon, American Metal Climax Inc., New York; C. E. Schwab, Bunker Hill Co., Kellogg, Idaho; and H. L. Young, American Zinc Sales Co., St. Louis.

Permanent Magnet Producers Association, Chicago, elected these officers: President, W. G. Scharnberger, Spaulding Cast Products Div., Harrison, N. J., Crucible Steel Co. of America; vice president, W. E. Gilman, General Magnetics Corp., Chicago; and treasurer, H. R. Bulmore, Simonds Saw & Steel Co., Lockport, N. Y. H. P. Dolan is executive secretary.

Ray G. Halvorsen, Hamilton Mfg. Co., Two Rivers, Wis., was elected president of the **Scientific Apparatus Makers Association,** Chicago. P. S. Dickey, Bailey Meter Co., Cleveland, was elected president pro tempore. T. M. Mints, E. H. Sargent & Co., Chicago, was re-elected treasurer.

Industrial Research Institute Inc., New York, elected these officers: President, Dr. Howard S. Turner, Jones & Laughlin Steel Corp., Pittsburgh; and vice president and president-elect, Donald P. Krotz, California Research Corp., San Francisco. C. G. Worthington is secretary-treasurer.

G. Brooks Earnest, president of Fenn College, Cleveland, is the official nominee for 1962 president of the **American Society of Civil Engineers,** New York. He will take office in October.

American Society for Metals, Metals Park (Novelty), Ohio, has announced these appointments: Dr. Allen G. Gray, editor of periodical publications; Dr. Taylor Lyman, editor of reference publications.

Association of Lift Truck & Portable Elevator Manufacturers, Pitts-

To Meet Customer Demands

New Side Trimming Line Installed In Tin Mill Will Improve Production Of Tinplate In Coils

Installation Called Most Modern Of Type In Industry

A new side trimming line to facilitate the production of tinplate in coils in Weirton Steel's Tin Mill Department was placed in operation recently.

W. H. Wright, Vice President and Chief Engineer, said the new installation, rated among the most modern pieces of equipment in the steel industry, was installed because of the increasing demand from customers for tinplate in coil form. The company will also continue to ship tinplate in the conventional cut sheets.

The new side trimming line, which began operating last month, and a second line, installed on an emergency basis, are used to trim the sides of the sheet steel before it is plated with tin, so it can be wound into coils and be ready for shipment as it comes off the tinning lines.

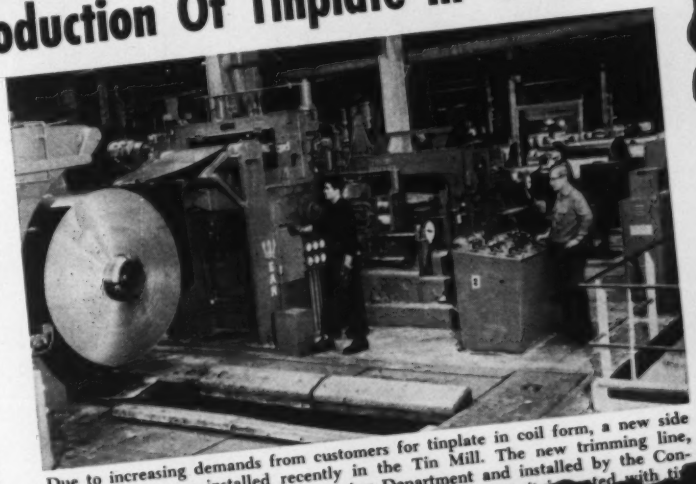
Mr. Wright explained that Weirton Steel's No. 4 and No. 5 tinplating lines have been equipped with edge control reels which insure that each coil is wrapped with a straight edge. This is necessary to prevent damage to the edges in bundling and shipping and also because straight edges are required when the coils are processed further by Weirton Steel customers.

Mr. Wright also reported the installation of a new bundling line, which began operating about three months before the new side trimmer. The bundling line utilizes machinery to wrap coils in heavy paper and fasten them with steel straps. Formerly, this was a hand operation.

The side trimming operation takes place after the steel has been tempered to customer specification by the skin mills and before it is plated with tin. This process eliminates the waste which formerly resulted when the side trimming was done on the cutting lines, after the tinplating process.

The No. 2 side trimming line has a maximum speed of 4,000 feet per minute while the No. 1 line operates at a speed of 1,200 feet per minute. The No. 2 line is able to handle 30-ton coils 85 inches in diameter and 45 inches wide. The line also is equipped with a mash welder, a relatively new operation which provides a smoother weld that does not damage other sections of the coil as it is wound.

All of the new facilities were designed by the Weirton Steel Engineering Department and installed by the company's Construction Department.



Due to increasing demands from customers for tinplate in coil form, a new side trimming line was installed recently in the Tin Mill. The new trimming line, designed by Weirton Steel's Engineering Department and installed by the Construction D[illegible] the [illegible] of sheet steel bef[illegible] ted with ti[illegible]

Reprinted from Employees Bulletin, Weirton Steel Company, February, 1960

Once again—

proof that GPE Controls is the Steel Industry's "Partner in Progress"

The tin mill side trimming line at Weirton Steel Company, Division of National Steel Corp., was furnished by Wean Engineering Co., and equipped with the industry's most modern edge guide equipment—designed and built by GPE Controls, Inc.

Only GPE Controls offers steel mill edge guides with . . .

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★ Unlimited force output with cylinder pressures to 2000 p.s.i., flows to 140 g.p.m and higher.

★ Variable-gain booster for simple screwdriver job-site matching of control system to speed, coil weight, etc.

Write for NEW Bulletin EG84, which tells all about GPE Controls web guiding systems—and be sure that GPE Controls are specified and furnished on your next strip and tin mill installation.

GPE Controls Model 300 Edge Control, as furnished to Weirton Steel Company.

GPE Controls, Inc.
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Chicago 11, Illinois

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COMPANY_____

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CITY_____ ZONE_____ STATE_____

burgh, elected these officers: President, K. E. Forster, Barrett-Cravens Co., Northbrook, Ill.; and vice president, S. R. Bryant, Raymond Corp., Greene, N. Y. Hanson & Shea Inc., Pittsburgh, was designated secretary-treasurer.

NEW ADDRESSES

T. E. Conklin Brass & Copper Co. Inc. moved into larger quarters at 113 Leonard St., New York, N. Y. The firm is a distributor of nonferrous metals.

Gevaert Co. of America Inc., New York, moved its Atlanta district headquarters to 1297 Spring St. N.W., Atlanta 9, Ga.

Troxel Mfg. Co. moved its factory and offices to Moscow, Tenn., from Elyria, Ohio.

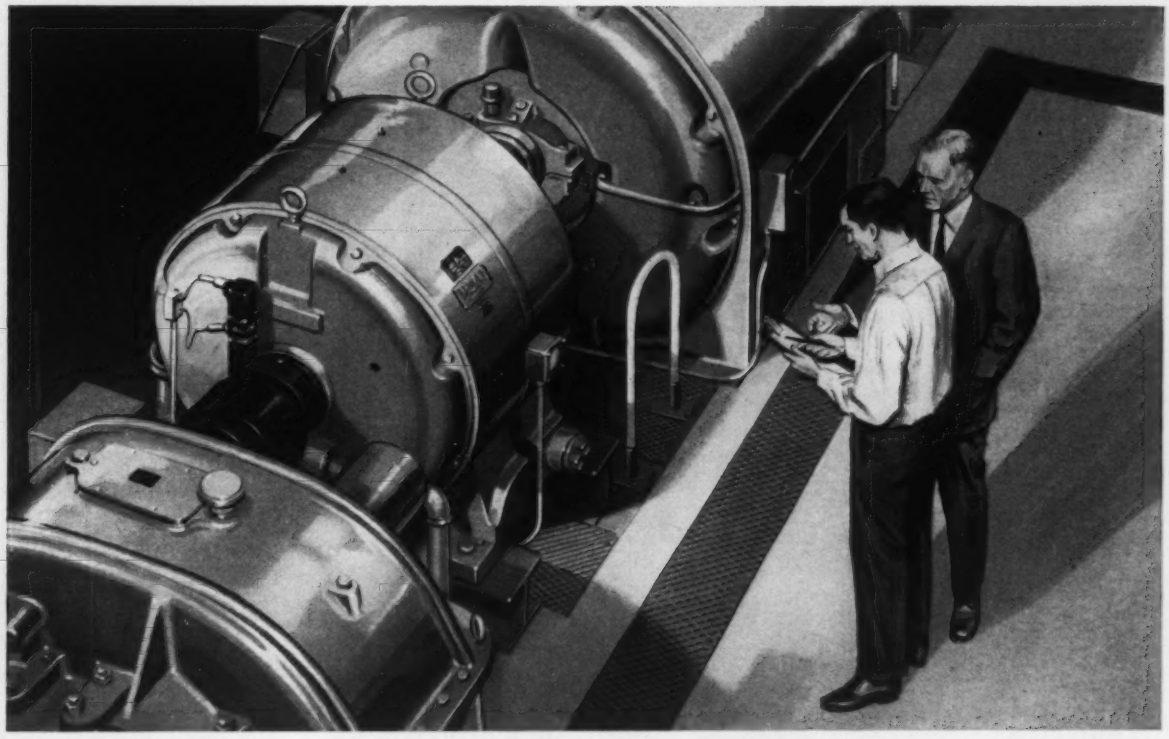
Moto-Truc Co. moved into its new 50,000 sq ft manufacturing and office building at 12400 Taft Ave., Cleveland, Ohio. The firm makes industrial trucks.

CONSOLIDATIONS

Bancroft-Hickey Mfg. Co., Bristol, Pa., purchased **Victor Inc.**, Paoli, Pa., manufacturer of diamond blades and masonry saws. Bancroft-Hickey, subsidiary of American Chain & Cable Co. Inc., Bridgeport, Conn., makes grinding wheels and other abrasive products.

Merger of **Lionel Corp.**, Hillside, N. J., and **Textron Electronics Inc.**, Providence, R. I., has been proposed. The surviving corporation would operate under the Lionel Corp. name. Gen. J. B. Medaris would be president and chief executive officer; Roy M. Cohn, chairman of the board; and Royal Little, chairman of the executive committee.

Vega Industries Inc., Syracuse, N. Y., acquired **Binghamton (N. Y.) Metal Forms Inc.**, manufacturer of steel forms. Vega makes metal products for the construction industry. Manufacturing operations will be continued in Binghamton, but



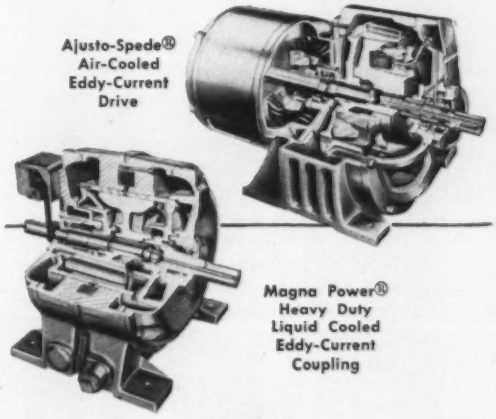
Place Your Speed Control Problems in the Hands of Experts!

As the originator and leading producer of eddy-current speed control equipment, it is only natural that Eaton-Dynamatic offers many exclusive design and construction advancements —plus expert engineering service.

The transmission of torque across an air gap by means of eddy-currents is a fundamental Dynamatic development. It was first utilized 30 years ago, and is today the operating principle of a full line of couplings, brakes, drives, and dynamometers serving industry wherever accurate control of speed and torque is required.

Eddy-current equipment runs on standard AC—requires no special power source. Electronic or transistorized magnetic amplifier controls, engineered and manufactured by Eaton, provide constant speed, infinitely adjustable speeds, and many specialized operating functions.

Representatives, located in all principal cities, are fully qualified to give you expert help with your speed control or torque transmission problems. Call the Eaton-Dynamatic representative nearest you today—there's no obligation.



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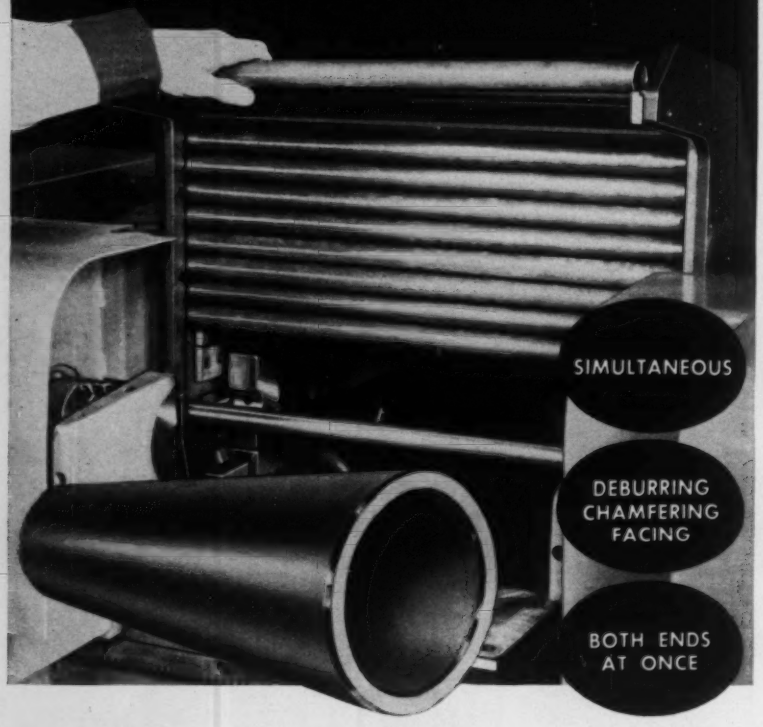
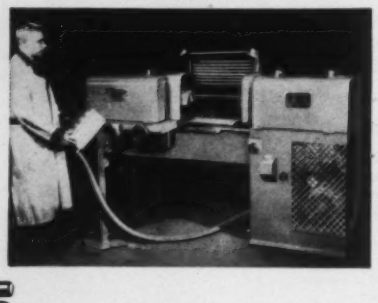
ANNOUNCING NEW PINES DOUBLE-END FINISHING MACHINE



HIGH PRODUCTION • ACCURACY • FLEXIBILITY

Filling the need for high production speeds and low unit costs, the new Model 666 Double-End Finishing Machine produces up to 1500 finished pieces an hour, holding length tolerances within .005". This new standard machine performs simultaneous inside-outside deburring, chamfering and facing, or light forming operations on both ends of tube, pipe, or rod. Workpieces are handled in diameters from ½" minimum to 3" maximum in lengths up to 60" on the standard bed machine, up to 120" on the extended bed machine. Operation is completely automatic with workpieces fed into machining position by the hydraulically operated Chute-Matic feed. Setup is fast with precision control of each machine function, easy adjustment to specific work length, and quick-change tool holders. Tooling is inexpensive with throw-away carbide bits. Special tooling arrangements are available to accommodate dedimpling. Find out now how this machine can help you produce parts faster, and at less cost.



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'61

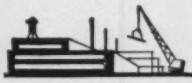
PINES ENGINEERING CO., INC.

Specialists in Tube Fabricating Machinery

664 WALNUT • AURORA, ILLINOIS

PRODUCTION BENDING • DEBURRING • CHAMFER MACHINERY

the sales staff will be moved to Vega's general offices in Syracuse.



NEW PLANTS

Allis-Chalmers Mfg. Co., Milwaukee, is completing construction of a multimillion dollar engine manufacturing plant at its Harvey (Ill.) Works. New machine tools and those being relocated from Plant 1 are being installed and will be placed in operation about July 1. Initial production will center around the firm's line of nine basic diesel and gasoline engines. Later in the year, the new plant will absorb production of six other engine models used in the company's line of material handling trucks. The facility contains about 515,000 sq ft of floor area.

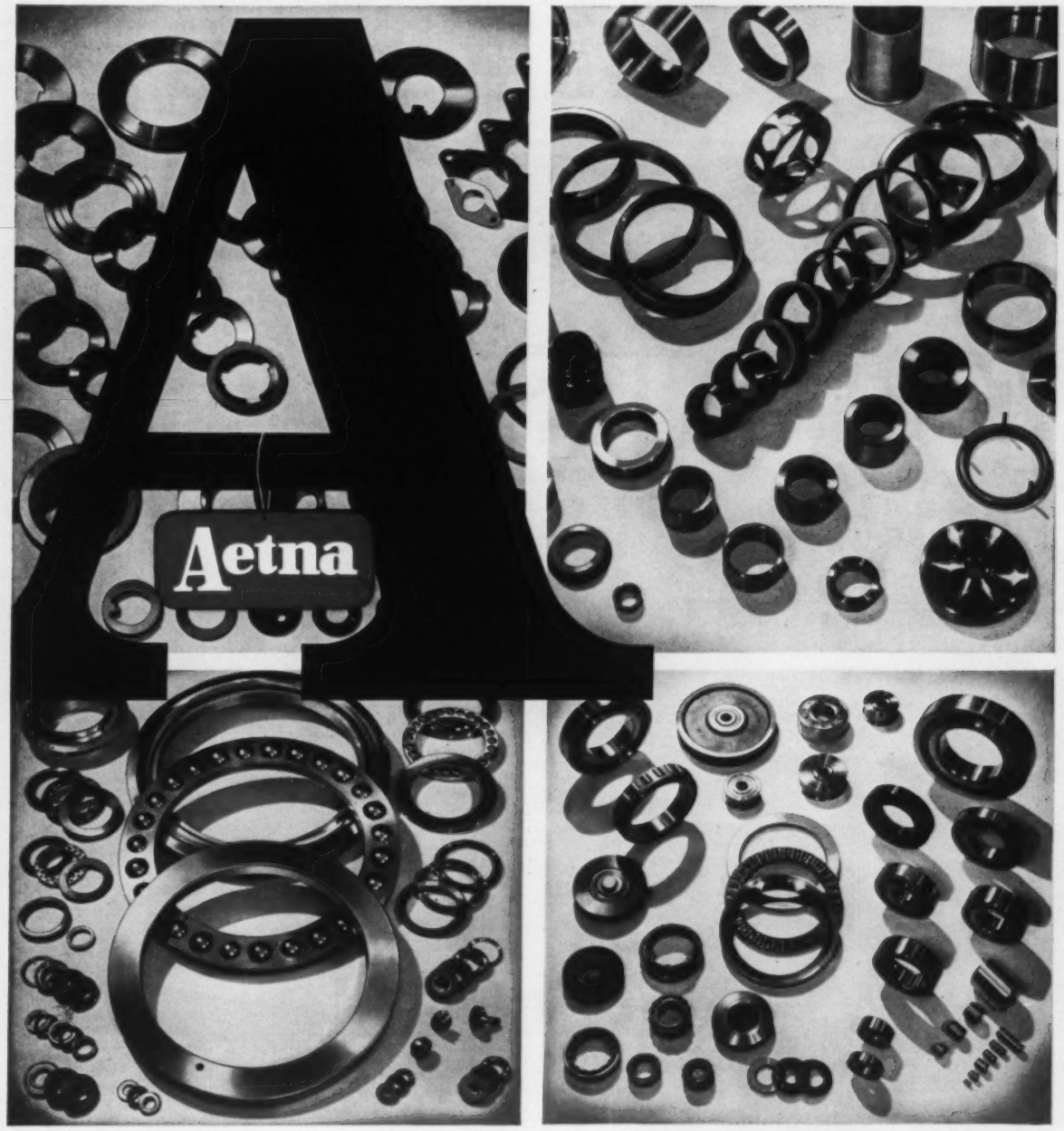
Hamilton Mfg. Co., Two Rivers, Wis., opened a distribution center at 719 Industrial Rd., San Carlos, Calif. W. C. Cox is the West Coast sales manager. Modular cabinetry will be stocked and assemblies completed at the new facility.

Ellis Fluid Dynamics Corp. opened a plant and offices at 7344 Monticello Ave., Skokie, Ill. The firm specializes in equipment for control of vibration and shock. John E. Ellis is president.

New Hampshire Ball Bearings Inc., Peterborough, N. H., is constructing a 19,000 sq ft plant at Laconia, N. H. The project is scheduled for completion by Sept. 1. Products will be commercial grade, miniature, and instrument ball bearings for applications in data processing equipment, computers, synchros, servomotors, and gear heads.

Dynamic Gear Co. Inc., Amityville, N. Y., opened a Western Div. plant in Van Nuys, Calif. The facility will produce precision stock gears, components, and complete assemblies. The entire equipment and inventory of Gear Products & Mfg. Co., Syosset, N. Y. (recently acquired by Dynamic Gear), is being transferred to Van Nuys to equip the new plant. Peter Buschelle is regional sales manger and will act as temporary general manager of the Western Div.

WHEN YOU NEED SPECIALS If your product calls for special bearings or hardened and ground precision parts, Aetna's many years of specialization in these areas can save you money. In fact, many times, original equipment manufacturers find their problems have already been studied and resolved by Aetna's engineers and that tooling is available. For other special units, Aetna can step in at any point—from research through design, testing, or production, to help solve your specific problem. Ask your Aetna representative—listed in your classified telephone directory—for detailed information on our design and production facilities, and outline your anti-friction or parts needs for our study, consideration, and recommendations.



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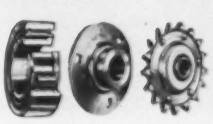
ANTI-FRICTION SUPPLIERS TO LEADING ORIGINAL EQUIPMENT MANUFACTURERS SINCE 1916



STRIKING WHILE THE METAL'S HOT

Here in fierce heat and pressure of the forging process is seen the literal birth of *endurance* in metal. No other method compares for preserving and improving physical properties. No other method refines metal structure to comparable levels of toughness and fatigue resistance—or provides like opportunity to reinforce strength at points of stress by control of grain flow.

Similarly, no other forging source offers the unique combination of capabilities, facilities and experience found at Wyman-Gordon. Here is the industry's broadest range of hot-working equipment—in hammer and press types, in closed-die forged weight and size capacity, in materials utilization. Here, too, is professional assistance in design and metallurgical problems—continuously updated by intensive research—providing significant contributions for aircraft, missile, nuclear, automotive, diesel, gas turbine, farm machinery and heavy equipment forging applications.

A Wyman-Gordon engineer stands ready to counsel on all such applications. He brings an invaluable backlog of field-and-laboratory data showing how to use forgings to the most economical advantage. His aid, while designs are still "on the board," can lead to lower end-use costs.

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TOUGHNESS

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GRAFTON MASSACHUSETTS — LOS ANGELES CALIFORNIA — PALO ALTO CALIFORNIA — FORT WORTH TEXAS

Engineers Face The Challenge Of Inertia

"The two greatest problems facing tool and manufacturing engineers today are: First, to keep up with our fast moving technology. Second, to sell top management on the necessity for investing in the results of that technology whenever it will pay off," says H. Dale Long, president, American Society of Tool & Mfg. Engineers.

INERTIA may be the major barrier to getting the U. S. industrial machine operating at its maximum production potential, Mr. Long feels.

He thinks tool and manufacturing engineers should do something about it, and he hopes next week's ASTME Convention in New York will give them some of the information and momentum they'll need.

Mr. Long, also president and chairman, Scully-Jones & Co., Chicago, says the inertia keeps engineers from becoming informed about new products and processes and from critically evaluating developments in terms of their own needs. It also keeps too many top managers on a fund conserving defense, rather than on an aggressive offense which leads to investment in processes and facilities.

"Surprisingly enough, even when new techniques are proved, too many engineers and executives don't bother to try to apply them. Knowing what's new isn't enough—you've also got to use what you know. You can take a picture with a camera, but you don't accomplish anything until you take the film out and develop it. Information stored in some engineer's head is valueless until it's brought out and developed."

Mr. Long says that most of us aren't concerned enough about doing a better job when present practice seems adequate. "We often terrifically underestimate our competitors, both foreign and domestic. When they make a positive move to new technology, it may well be too late for us to act."

• Present investment guides may be selling us short.

Mr. Long admits we have good tools to show how much a new investment will benefit the investor. "But we don't know how to measure the penalty for not investing, and we seldom even consider that side of it. We can learn, for example, that it will take a new piece of equipment

The 1961 ASTME Convention
New York, May 22-26
Coliseum Show: 1 to 9 p.m. Mon. & Tues.
9 a.m. to 6 p.m. Wed., Thurs., & Fri.
Headquarters Hotel: Statler Hilton

about eight years to pay for itself, and we may decide that's not fast enough. But we also must evaluate the alternative of continuing with present facilities and methods, faced by a competitor who makes the investment we don't. If the competitor buys and we don't, the adequacy of present methods could well be a myth."

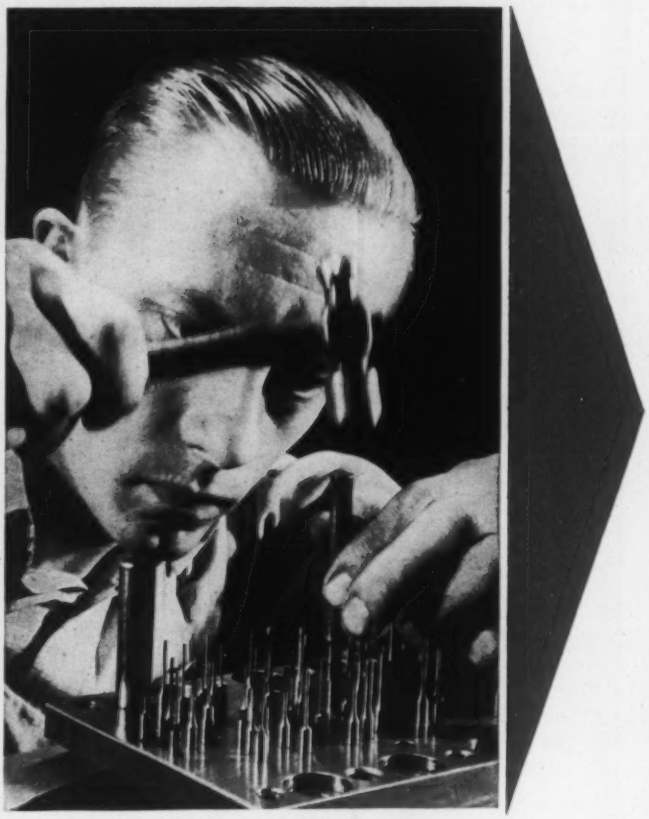
• **The conference and exposition are expected to spur remedial action.**

Mr. Long says: "To do the job, we have the big names and new, important subjects to discuss. Some 40,000 visitors are expected during the week's sessions. If we can provide information and incentive to only 1 out of every 10 visitors, we will have made a significant step toward helping tool and manufacturing engineers to do their job.

"We think no engineer who's concerned about holding his position and keeping his company up with an accelerating competitive pace can afford to miss the meetings and show, and others like them during the year."

More than $12 million worth of manufacturing equipment and tools will be on display at the New York Coliseum.

Simultaneously, 17 technical sessions will be held at the headquarters hotel, the Statler Hilton. Key subjects include: Manufacturing with numerical control, developments in cutting tool materials, powder metallurgy, progress in press tooling, and high energy rate metalworking. Technical papers will be presented by 50 industry experts.



ADDITIONAL COPIES

. . . of the 48 page Guide to Tool Steels & Carbides are available. The price: $1 per single copy; prices for larger quantities can be obtained on request. Write Reprint Department, STEEL, Penton Bldg., Cleveland 13, Ohio.

A GUIDE TO

TOOL STEELS & CARBIDES

MORE THAN 1200 different tool steels, carbides, and ceramic materials are listed in this Guide. The information will help you pick a material for your tooling jobs, or for critical structural applications.

The materials are the products of 79 companies. In this single source, you'll find the supplier for each material, suggested applications, and (where appropriate) chemical compositions and heat treating information.

Start with the indexes. They're designed to simplify your search for the right material.

MAY 15, 1961

STEEL
The Metalworking Weekly

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About This Guide

The box below suggests primary applications under which materials are listed. Suggested applications also can be interpreted in terms of material properties and may suggest other applications. Hot work tool steels, for example, are being used as structural materials where high heat strength is important.

The complete tradename index for all the listed materials also starts on this page, pairing the tradenames with the key to their sources. On Page S-6, the index to suppliers shows the companies listed, the types of materials offered by each, and the page on which company listings appear.

Breakdown of Primary Applications

COLD WORK DIES (Blanking)—Blanking—Lamination—Notching—Trimming.

COLD WORK DIES (Cold Forming)—Nut & bolt—Heading—Crowning & crimping—Thread & form rolling—Bulldozer—Stamping—Notching—Burnishing—Drawing—Coining—Wire, rod & tube drawing—Extruded—Swaging—Knurling—Powder compression—Embossing-jewelry etc.—Bending.

CUTTING TOOLS (Finishing)—Box turner—Forming—Shaving—Parting — Reaming — Boring — Counterboring — Broaching — Gear cutting — Threading — Milling — Planing — Filing—Scraping—Circular shearing—Hollow milling.

DIECASTING DIES—Molds—Trimming dies—Ejector pins.

GAGES—Plugs—Rings—Snap—Thread plug—Thread rings—Best types of tool steels used for making gages are the manganese oil hardening, high carbon chrome, graphite (oil hardening) & high speed.

HIGH STRESS & HIGH WEAR MACHINERY PARTS — Chuck jaws—Clutch pins—Collets & feed fingers—Clutch & chuck fingers—Quills—Stripper plates—Arbors—Drill bushings—Cams—Cam rolls—Centers—Mandrels—Spindles.

HOT WORK DIES (Hot Forming) — Forging die inserts — Hot gripper & header dies—Hot compression dies—Hot extrusion dies—Hot bending dies—Hot swaging dies.

HOT WORK DIES (Hot Punching & Shearing)—Railroad tie-plate hot punching & shearing—Railroad splice bar hot punching & shearing—Hot billet, bar & plate shears—Hot trimmers dies—Hot punches.

PLASTIC MOLDING DIES (Ejector Pins).

PLASTIC MOLDING DIES (Hubbed Cavity Dies).

PLASTIC MOLDING DIES (Hubs).

PLASTIC MOLDING DIES (Machine Cut Cavity Dies).

PUNCHING & SHEARING — Railroad tie-plate punches & dies—Railroad tie-plate shear blades—Structural shapes, shear blades & punches—Perforating punches & dies.

SHOCK RESISTING (Intermittent Impact)—Dowel pins—Drifts—Pilots—Screw driving—Tool shanks.

SHOCK RESISTING (Repeated Impact)—Bearing—Riveting—Backing up—Burring—Calking—Chisels—Hammers—Swaging.

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Products are available for the primary application indicated by an (x) in this table opposite company's name. For more specific information see company's complete listing on page indicated.

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		Cold Work Dies	Cutting Tools	Die-casting Dies	Gages	Hi-Stress Non-Wear Mach'y Parts	Hot Work Dies	Plastic Mold Dies	Punching and Shearing	Shock Resisting			
1—Ackerlind Steel Co. Inc.	S-7	X	X	X	X	..	X	X	X	..	..	..	..
2—Adamas Carbide Corp.	S-8	X	X	..	..	X	..	..	..	..	..	X	..
3—**Allegheny Ludlum Steel Corp.**	S-8	X	X	X	X	X	X	X	..	X	..	X	..
4—Amalgamated Steel Corp.	S-10	X	..	X	X	X	..	X	X	X	..	..	..
5—American Feldmuehle Corp.	S-11	..	..	..	..	..	..	..	..	..	..	..	X
74—Anchor Drawn Steel Co.	S-45	X	X	X	X	X	X	X	X	X	..	..	..
6—Armstrong Bros. Tool Co.	S-11	..	X	..	..	..	..	..	..	..	X	X	..
7—Associated Steel Co.	S-11	X	X	..	..	X	..	..	..	X	..	..	..
8—Atlantic Steel Corp.	S-11	X	X	..	..	..	..	..	X	X	..	..	..
9—**Atlas Steels Ltd.**	S-12	X	X	X	..	..	X	X	X	..	..	..	..
10—Bedford Tool & Forge Co.	S-13	..	..	..	..	..	..	..	..	X	..	..	..
11—**Bethlehem Steel Co.**	S-13	X	X	X	..	..	X	X	X	X	..	..	..
12—Blackalloy Co. of America	S-14	..	X	..	..	..	..	..	..	..	..	..	..
13—H. Boker & Co. Inc.	S-14	X	X	..	..	..	..	..	..	..	..	..	..
14—Boyd-Wagner Co.	S-14	X	X	..	X	X	X	..	X	X	..	..	..
15—**Braeburn Alloy Steel Corp.**	S-15	X	X	..	..	..	X	..	..	X	..	..	..
16—Brown & Sharpe Mfg. Co., Industrial Products Div.	S-16	X	..	..	X	..	..	..	..	..	..	..	..
17—Carborundum Co., Stupalox Project	S-16	..	..	..	..	..	..	..	..	..	..	..	X
18—**Carpenter Steel Co.**	S-16	X	X	X	X	X	X	X	X	X	..	..	..
19—Champion Steel Co.	S-17	X	..	..	..	..	X	X	X	X	..	..	..
20—Chromalloy Corp., Sintercast Div.	S-17	X	X	..	..	..	X	..	..	..	..	..	X
74—Colonial Steel Co.	S-45	X	X	X	X	X	X	X	..	X	..	X	..
21—**Columbia Tool Steel Co.**	S-18	X	X	X	X	..	X	X	X	X	..	..	..
22—**Crucible Steel Co. of America**	S-19	X	X	X	X	X	X	X	X	X	..	..	..
23—Darwin & Milner Inc.	S-20	X	X	..	..	..	X	X	X	X	..	..	..
24—Delaware Tool Steel Corp.	S-21	..	..	..	..	..	..	..	..	X	..	..	..
25—Diamonite Products Mfg. Co.	S-21	..	..	..	..	..	..	..	..	..	..	..	X
26—Diehl Steel Co.	S-21	X	X	..	..	..	X	..	X	..	..	..	..
27—DoAll Co.	S-21	X	X	..	..	X	..	..	..	X	..	X	..
28—Fagersta Steels Inc.	S-22	X	X	X	..	..	X	X	..	X	..	..	..
29—Fagersta Steels Pacific Inc.	S-22	X	X	..	..	..	X	X	..	X	..	..	..
30—Faitoute Iron & Steel Co.	S-23	X	X	..	..	..	..	..	..	X	..	..	..
31—**A. Finkl & Sons Co.**	S-23	..	..	..	..	..	X	..	X	..	..	..	..
32—Firth-Loach Metals Inc.	S-24	X	X	..	..	..	..	..	X	..	..	X	..
33—**Firth Sterling Inc.**	S-24	X	X	..	..	..	X	..	X	X	..	X	..
34—General Electric Co. Metallurgical Products Dept.	S-25	X	X	..	..	X	..	..	..	..	..	X	X
35—Gulton Industries Inc., International Div.	S-25	..	..	..	..	..	..	..	..	..	..	..	X
36—Hawkridge Bros. Co.	S-25	X	..	..	..	..	..	..	..	X	..	..	..
37—Haynes Stellite Co.	S-26	..	X	X	..	X	..	..	X	X	X	..	..
38—**Heppenstall Co.**	S-26	X	..	X	..	..	X	X	X	..	..	..	..
39—Hidalgo Steel Co.	S-27	X	..	..	..	..	..	..	X	X	..	..	..
40—Houghton & Richards Inc.	S-27	X	X	X	..	..	X	X	X	X	..	..	..
41—Jamison Steel Corp.	S-29	X	..	..	..	..	X	..	..	..	..	..	..
42—**Jessop Steel Co.**	S-29	X	X	X	X	..	X	..	X	X	..	..	..
43—Kennametal Inc.	S-30	X	X	..	..	X	..	..	..	..	..	X	..
44—Kloster Steel Corp.	S-31	X	X	..	..	..	X	..	..	X	..	..	..
45—**Latrobe Steel Co.**	S-31	X	X	X	X	X	X	X	X	X	..	..	..
46—Lehigh Steel Corp.	S-32	X	X	..	..	X	X	..	X	X	..	..	..
47—Ludlow Steel Corp.	S-32	X	X	..	..	X	..	..	..	..	..	..	..
48—P. F. McDonald & Co.	S-33	X	X	X	..	..	X	X	X	X	..	..	..
49—McInnes Steel Co.	S-34	X	..	..	..	..	..	..	..	..	..	..	..
50—Marshall Steel Co.	S-34	X	..	..	..	..	..	..	..	..	..	..	..
51—Meridian Steel Co. Inc.	S-34	X	X	..	..	X	X	..	X	X	..	X	..
52—Metal Carbides Corp.	S-34	X	X	..	..	..	..	..	X	X	..	X	..
53—A. Milne & Co.	S-34	X	X	X	X	X	X	X	X	X	..	..	..
54—Newcomer Products Inc.	S-35	..	X	..	..	..	..	..	..	..	..	X	..
55—North American Steel Co.	S-35	X	..	..	..	X	..	..	..	..	..	..	..
56—Peninsular Steel Co.	S-36	X	..	X	X	..	X	X	X	X	..	..	..
57—Pennsylvania Steel Corp.	S-36	X	X	..	..	X	X	..	X	..	..	..	..
58—Pittsburgh Tool Steel Wire Co.	S-37	X	..	..	..	..	..	..	..	..	..	..	..
59—**H. K. Porter Company Inc., Vulcan-Kidd Steel Div.**	S-37	X	X	X	X	X	X	X	X	..	..	..	..
60—Horace T. Potts Co.	S-38	..	..	X	..	X	..	..	..	..	..	..	..
61—Pyramid Steel Co.	S-38	X	..	..	..	X	..	..	..	X	..	..	..

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		Cold Work Dies	Cutting Tools	Die-casting Dies	Gages	Hi-Stress Non-Wear Mach'y Parts	Hot Work Dies	Plastic Mold Dies	Punching and Shearing	Shock Resisting			
62—Redwood Corp.	S-39	X	X	..	..	X	X	X	..	X	..	..	..
63—Republic Steel Corp.	S-40	X	X	X	..	..	X	X	..	X	..	..	..
64—Joseph T. Ryerson & Son Inc.	S-41	X	X	X	X	X	..	X	X	X	..	..	..
65—Sandvik Steel Inc.	S-41	..	X	..	..	..	..	..	..	..	..	X	..
66—Seaboard Steel Co. of America	S-42	X	X	..	..	..	..	..	X	X	..	..	..
67—**Simonds Saw & Steel Co.**	S-42	X	X	..	..	..	X	..	..	X	..	..	..
68—L. S. Starrett Co.	S-42	X	..	..	..	..	..	..	X	..	..	..	..
69—**Timken Roller Bearing Co.**	S-42	X	..	..	X	X	..	X	X	..	..	..	..
70—Tungsten Alloy Mfg. Co. Inc.	S-43	..	X	..	..	X	..	..	..	X	..	X	..
71—Uddeholm Co. of America Inc.	S-43	X	..	X	X	..	X	X	X	X	..	..	..
72—Universal Alloy Steel Co.	S-44	..	..	..	..	X	..	..	..	X	..	..	..
73—**Universal-Cyclops Steel Corp.**	S-44	X	X	X	X	..	X	X	X	X	..	..	..
74—**Vanadium-Alloys Steel Co.**	S-45	X	X	X	X	X	X	X	X	X	..	..	..
75—Vascoloy-Ramet Corp.	S-47	X	X	..	..	X	X	..	X	X	X	X	X
76—Wesson Co.	S-47	..	X	..	..	X	..	..	..	X	..	X	..
77—Wheelock, Lovejoy & Co. Inc.	S-47	X	..	X	X	..	..	X	X	X	..	..	..
78—Willey's Carbide Tool Co.	S-48	..	X	..	..	X	..	..	..	X	..	..	..
79—Ziv Steel & Wire Co.	S-48	X	X	X	X	X	X	X	X	X	..	..	..

*Companies whose names appear in **dark type** are producers with primary tool steel melting facilities. They report their shipments to the Committee of Tool Steel Producers, American Iron & Steel Institute, New York.

ACKERLIND STEEL CO. INC., 392 W. Broadway, New York 12, N. Y. — Listing No. 1

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Cold Work Dies (Blanking, Cold Forming, Punching, Shearing)	A.S. #5 Air Hardening	A2	C 1.00, Mn 0.60, Cr 5.25, Mo 1.10, V 0.25	Air Mach. 70 Movement +A
Cold Work Dies (Blanking, Cold Forming, Punching & Shearing)	A.S. IMPROVED #121 Air Hardening	A4	C 0.95, Mn 2.00, Cr 2.20, Mo 1.10	Air Mach. 90 Movement +A
Cold Work Dies (Blanking, Cold Forming, Punching & Shearing)	A.S. ACK-LOW Air Hardening	A6	C 0.70, Mn 2.10, Cr 1.00, Mo 1.30	Air Mach. 90 Movement +A
Cold Work Dies (Blanking, Cold Forming, Punching, Shearing)	A.S. TRI-ACK Air Hardening	D2	C 1.50, Si 0.30, Mn 0.30, Cr 12.00, Mo 0.80, V 0.40	Air Mach. 45 Movement +A
Cold Work Dies (Blanking, Cold Forming, Punching, Shearing)	BLUE LABEL Water Hardening	W1	C 1.00, Mn 0.30, Si 0.25	Water Mach. 100 Movement ±C
Cold Work Dies (Blanking, Cold Forming, Punching, Shearing)	GREEN LABEL Oil Hardening	O1	C 0.90, Mn 1.15, Si 0.25, Cr 0.50, W 0.50, V 0.20	Oil Mach. 90 Movement +B
Cold Work Dies (Blanking, Cold Forming, Punching, Shearing)	VI-CHROME Oil Hardening	D3	C 2.25, Cr 12.00, Mn 0.30, Si 0.30, V 0.60	Oil Mach. 40 Movement +B
Cold Work Dies (Blanking, Cold Forming, Punching & Shearing)	VI-CHROME "W" Oil Hardening	D6	C 2.00, Cr 13.00, W 1.20, Mn 0.70, Si 0.30	Oil Mach. 40 Movement +B
Cold Work Dies (Blanking, Cold Forming, Punching, Shearing)	VIOLET LABEL Oil Hardening	O7	C 0.90, Mn 0.30 max, Si 0.25, Cr 0.50, W 1.50, V 0.20	Oil Mach. 80 Movement +B
Cold Work Dies (Blanking, Cold Forming, Punching, Shearing)	WHITE LABEL Water Hardening	W2	C 1.05, Mn 0.30, Si 0.25, V 0.20	Water Mach. 95 Movement ±C
Cutting Tools (Roughing, Finishing)	A.S. No. 66 High Speed	M2	C 0.85, Cr 4.00, W 6.50, Mo 5.00, V 1.90	Oil, Air Mach. 65 Movement ±A
Diecasting Dies	A.S. #670 Air Hardening	H13	C 0.38, Si 1.00, Cr 5.25, Mo 1.25, V 1.05	Air Mach. 70 Movement +A
Diecasting Dies	A.S. CROMO WV Air Hardening	H12	C 0.35, Si 1.05, Cr 5.15, Mo 1.55, W 1.25, V 0.30	Air Mach. 70 Movement +A
Diecasting Dies	A.S. LUSTRE-DIE Prehardened		C 0.50, Mn 1.00, Si 0.30, Cr 1.10, Mo 0.25	Prehardened No movement
Gages	(See A.S. TRI-ACK, A.S. #5, GREEN LABEL, WHITE LABEL, Listed Above)			
Hot Work Dies (Hot Extrusion, Upset Forged Discs)	(See A.S. CROMO WV, Listed Above)			
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	(See A.S. #670, A.S. CROMO WV, Listed Above)			
Plastic Molding Dies	A.S. DURAMOLD B Oil Hardening	P2	C 0.07, Mn 0.30, Cr 1.00, Mo 0.25, Si 0.15, Boron Added	Oil Mach. 50 Movement +B
Plastic Molding Dies	A.S. SPECIAL HOBBING IRON Water Hardening	P1	C 0.05, Mn 0.10, Si 0.10	Water Mach. 40 Movement +C

★ Last column indicates suggested Quenching Medium; Machinability Annealed, using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

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1—Ackerlind Steel Co. Inc.	S-7	X	X	X	X	..	X	X	X	..	..	..	..
2—Adamas Carbide Corp.	S-8	X	X	..	..	X	..	..	..	..	..	X	..
3—**Allegheny Ludlum Steel Corp.**	S-8	X	X	X	X	X	X	X	..	X	..	X	..
4—Amalgamated Steel Corp.	S-10	X	..	X	X	X	..	X	X	X	..	..	..
5—American Feldmuehle Corp.	S-11	..	..	..	..	..	..	..	..	..	..	..	X
74—Anchor Drawn Steel Co.	S-45	X	X	X	X	X	X	X	X	X	..	..	..
6—Armstrong Bros. Tool Co.	S-11	..	X	..	..	..	..	..	..	..	X	X	..
7—Associated Steel Co.	S-11	X	X	..	..	X	..	..	..	X	..	..	..
8—Atlantic Steel Corp.	S-11	X	X	..	..	..	..	..	X	X	..	..	..
9—**Atlas Steels Ltd.**	S-12	X	X	X	..	..	X	X	X	..	..	..	..
10—Bedford Tool & Forge Co.	S-13	..	..	..	..	..	..	..	..	X	..	..	..
11—**Bethlehem Steel Co.**	S-13	X	X	X	..	..	X	X	X	X	..	..	..
12—Blackalloy Co. of America	S-14	..	X	..	..	..	..	..	..	..	..	..	..
13—H. Boker & Co. Inc.	S-14	X	X	..	..	..	..	..	..	..	..	..	..
14—Boyd-Wagner Co.	S-14	X	X	..	X	X	X	..	X	X	..	..	..
15—**Braeburn Alloy Steel Corp.**	S-15	X	X	..	..	..	X	..	..	X	..	..	..
16—Brown & Sharpe Mfg. Co., Industrial Products Div.	S-16	X	..	..	X	..	..	..	..	..	..	..	..
17—Carborundum Co., Stupalox Project	S-16	..	..	..	..	..	..	..	..	..	..	..	X
18—**Carpenter Steel Co.**	S-16	X	X	X	X	X	X	X	X	X	..	..	..
19—Champion Steel Co.	S-17	X	..	..	..	..	X	X	X	X	..	..	..
20—Chromalloy Corp., Sintercast Div.	S-17	X	X	..	..	..	X	..	..	..	..	..	X
74—Colonial Steel Co.	S-45	X	X	X	X	X	X	X	..	X	..	X	..
21—**Columbia Tool Steel Co.**	S-18	X	X	X	X	..	X	X	X	X	..	..	..
22—**Crucible Steel Co. of America**	S-19	X	X	X	X	X	X	X	X	X	..	..	..
23—Darwin & Milner Inc.	S-20	X	X	..	..	..	X	X	X	X	..	..	..
24—Delaware Tool Steel Corp.	S-21	..	..	..	..	..	..	..	..	X	..	..	..
25—Diamonite Products Mfg. Co.	S-21	..	..	..	..	..	..	..	..	..	..	..	X
26—Diehl Steel Co.	S-21	X	X	..	..	..	X	..	X	..	..	..	..
27—DoAll Co.	S-21	X	X	..	..	X	..	..	..	X	..	X	..
28—Fagersta Steels Inc.	S-22	X	X	X	..	..	X	X	..	X	..	..	..
29—Fagersta Steels Pacific Inc.	S-22	X	X	..	..	..	X	X	..	X	..	..	..
30—Faitoute Iron & Steel Co.	S-23	X	X	..	..	..	..	..	..	X	..	..	..
31—**A. Finkl & Sons Co.**	S-23	..	..	..	..	..	X	..	X	..	..	..	..
32—Firth-Loach Metals Inc.	S-24	X	X	..	..	..	..	..	X	..	..	X	..
33—**Firth Sterling Inc.**	S-24	X	X	..	..	..	X	..	X	X	..	X	..
34—General Electric Co. Metallurgical Products Dept.	S-25	X	X	..	..	X	..	..	..	..	..	X	X
35—Gulton Industries Inc., International Div.	S-25	..	..	..	..	..	..	..	..	..	..	..	X
36—Hawkridge Bros. Co.	S-25	X	..	..	..	..	..	..	..	X	..	..	..
37—Haynes Stellite Co.	S-26	..	X	X	..	X	..	..	X	X	X	..	..
38—**Heppenstall Co.**	S-26	X	..	X	..	..	X	X	X	..	..	..	..
39—Hidalgo Steel Co.	S-27	X	..	..	..	..	..	..	X	X	..	..	..
40—Houghton & Richards Inc.	S-27	X	X	X	..	..	X	X	X	X	..	..	..
41—Jamison Steel Corp.	S-29	X	..	..	..	..	X	..	..	..	..	..	..
42—**Jessop Steel Co.**	S-29	X	X	X	X	..	X	..	X	X	..	..	..
43—Kennametal Inc.	S-30	X	X	..	..	X	..	..	..	..	..	X	..
44—Kloster Steel Corp.	S-31	X	X	..	..	..	X	..	..	X	..	..	..
45—**Latrobe Steel Co.**	S-31	X	X	X	X	X	X	X	X	X	..	..	..
46—Lehigh Steel Corp.	S-32	X	X	..	..	X	X	..	X	X	..	..	..
47—Ludlow Steel Corp.	S-32	X	X	..	..	X	..	..	..	..	..	..	..
48—P. F. McDonald & Co.	S-33	X	X	X	..	..	X	X	X	X	..	..	..
49—McInnes Steel Co.	S-34	X	..	..	..	..	..	..	..	..	..	..	..
50—Marshall Steel Co.	S-34	X	..	..	..	..	..	..	..	..	..	..	..
51—Meridian Steel Co. Inc.	S-34	X	X	..	..	X	X	..	X	X	..	X	..
52—Metal Carbides Corp.	S-34	X	X	..	..	..	..	..	X	X	..	X	..
53—A. Milne & Co.	S-34	X	X	X	X	X	X	X	X	X	..	..	..
54—Newcomer Products Inc.	S-35	..	X	..	..	..	..	..	..	..	..	X	..
55—North American Steel Co.	S-35	X	..	..	..	X	..	..	..	..	..	..	..
56—Peninsular Steel Co.	S-36	X	..	X	X	..	X	X	X	X	..	..	..
57—Pennsylvania Steel Corp.	S-36	X	X	..	..	X	X	..	X	..	..	..	..
58—Pittsburgh Tool Steel Wire Co.	S-37	X	..	..	..	..	..	..	..	..	..	..	..
59—**H. K. Porter Company Inc., Vulcan-Kidd Steel Div.**	S-37	X	X	X	X	X	X	X	X	..	..	..	..
60—Horace T. Potts Co.	S-38	..	..	X	..	X	..	..	..	..	..	..	..
61—Pyramid Steel Co.	S-38	X	..	..	..	X	..	..	..	X	..	..	..

Products are available for the primary application indicated by an (x) in this table opposite company's name. For more specific information see company's complete listing on page indicated.

LISTING NUMBER and COMPANY	PAGE NO.	PRIMARY APPLICATIONS FOR WHICH PRODUCTS ARE LISTED									CAST TYPE	CARBIDES	CERAMIC CUTTING TOOLS
		Cold Work Dies	Cutting Tools	Die-casting Dies	Gages	Hi-Stress Non-Wear Mach'y Parts	Hot Work Dies	Plastic Mold Dies	Punching and Shearing	Shock Resisting			
62—Redwood Corp.	S-39	X	X	..	..	X	X	X	..	X	..	..	..
63—Republic Steel Corp.	S-40	X	X	X	..	..	X	X	..	X	..	..	..
64—Joseph T. Ryerson & Son Inc.	S-41	X	X	X	X	X	..	X	X	X	..	..	..
65—Sandvik Steel Inc.	S-41	..	X	..	..	..	..	..	..	..	..	X	..
66—Seaboard Steel Co. of America	S-42	X	X	..	..	..	..	..	X	X	..	..	..
67—**Simonds Saw & Steel Co.**	S-42	X	X	..	..	..	X	..	..	X	..	..	..
68—L. S. Starrett Co.	S-42	X	..	..	..	..	..	..	X	..	..	..	..
69—**Timken Roller Bearing Co.**	S-42	X	..	..	X	X	..	X	X	..	..	..	..
70—Tungsten Alloy Mfg. Co. Inc.	S-43	..	X	..	..	X	..	..	..	X	..	X	..
71—Uddeholm Co. of America Inc.	S-43	X	..	X	X	..	X	X	X	X	..	..	..
72—Universal Alloy Steel Co.	S-44	..	..	..	..	X	..	..	..	X	..	..	..
73—**Universal-Cyclops Steel Corp.**	S-44	X	X	X	X	..	X	X	X	X	..	..	..
74—**Vanadium-Alloys Steel Co.**	S-45	X	X	X	X	X	X	X	X	X	..	..	..
75—Vascoloy-Ramet Corp.	S-47	X	X	..	..	X	X	..	X	X	X	X	X
76—Wesson Co.	S-47	..	X	..	..	X	..	..	..	X	..	X	..
77—Wheelock, Lovejoy & Co. Inc.	S-47	X	..	X	X	..	..	X	X	X	..	..	..
78—Willey's Carbide Tool Co.	S-48	..	X	..	..	X	..	..	..	X	..	..	..
79—Ziv Steel & Wire Co.	S-48	X	X	X	X	X	X	X	X	X	..	..	..

*Companies whose names appear in **dark type** are producers with primary tool steel melting facilities. They report their shipments to the Committee of Tool Steel Producers, American Iron & Steel Institute, New York.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.

ACKERLIND STEEL CO. INC., 392 W. Broadway, New York 12, N. Y. — Listing No. 1

Cold Work Dies (Blanking, Cold Forming, Punching, Shearing)	A.S. #5 Air Hardening	A2	C 1.00, Mn 0.60, Cr 5.25, Mo 1.10, V 0.25	Air Mach. 70 Movement + A
Cold Work Dies (Blanking, Cold Forming, Punching & Shearing)	A.S. IMPROVED #121 Air Hardening	A4	C 0.95, Mn 2.00, Cr 2.20, Mo 1.10	Air Mach. 90 Movement + A
Cold Work Dies (Blanking, Cold Forming, Punching & Shearing)	A.S. ACK-LOW Air Hardening	A6	C 0.70, Mn 2.10, Cr 1.00, Mo 1.30	Air Mach. 90 Movement + A
Cold Work Dies (Blanking, Cold Forming, Punching, Shearing)	A.S. TRI-ACK Air Hardening	D2	C 1.50, Si 0.30, Mn 0.30, Cr 12.00, Mo 0.80, V 0.40	Air Mach. 45 Movement + A
Cold Work Dies (Blanking, Cold Forming, Punching, Shearing)	BLUE LABEL Water Hardening	W1	C 1.00, Mn 0.30, Si 0.25	Water Mach. 100 Movement ±C
Cold Work Dies (Blanking, Cold Forming, Punching, Shearing)	GREEN LABEL Oil Hardening	O1	C 0.90, Mn 1.15, Si 0.25, Cr 0.50, W 0.50, V 0.20	Oil Mach. 90 Movement + B
Cold Work Dies (Blanking, Cold Forming, Punching, Shearing)	VI-CHROME Oil Hardening	D3	C 2.25, Cr 12.00, Mn 0.30, Si 0.30, V 0.60	Oil Mach. 40 Movement + B
Cold Work Dies (Blanking, Cold Forming, Punching & Shearing)	VI-CHROME "W" Oil Hardening	D6	C 2.00, Cr 13.00, W 1.20, Mn 0.70, Si 0.30	Oil Mach. 40 Movement + B
Cold Work Dies (Blanking, Cold Forming, Punching; Shearing)	VIOLET LABEL Oil Hardening	O7	C 0.90, Mn 0.30 max, Si 0.25, Cr 0.50, W 1.50, V 0.20	Oil Mach. 80 Movement + B
Cold Work Dies (Blanking, Cold Forming, Punching, Shearing)	WHITE LABEL Water Hardening	W2	C 1.05, Mn 0.30, Si 0.25, V 0.20	Water Mach. 95 Movement ±C
Cutting Tools (Roughing, Finishing)	A.S. No. 66 High Speed	M2	C 0.85, Cr 4.00, W 6.50, Mo 5.00, V 1.90	Oil, Air Mach. 65 Movement ±A
Diecasting Dies	A.S. #670 Air Hardening	H13	C 0.38, Si 1.00, Cr 5.25, Mo 1.25, V 1.05	Air Mach. 70 Movement + A
Diecasting Dies	A.S. CROMO WV Air Hardening	H12	C 0.35, Si 1.05, Cr 5.15, Mo 1.55, W 1.25, V 0.30	Air Mach. 70 Movement + A
Diecasting Dies	A.S. LUSTRE-DIE Prehardened		C 0.50, Mn 1.00, Si 0.30, Cr 1.10, Mo 0.25	Prehardened No movement
Gages	(See A.S. TRI-ACK, A.S. #5, GREEN LABEL, WHITE LABEL, Listed Above)			
Hot Work Dies (Hot Extrusion, Upset Forged Discs)	(See A.S. CROMO WV, Listed Above)			
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	(See A.S. #670, A.S. CROMO WV, Listed Above)			
Plastic Molding Dies	A.S. DURAMOLD B Oil Hardening	P2	C 0.07, Mn 0.30, Cr 1.00, Mo 0.25, Si 0.15, Boron Added	Oil Mach. 50 Movement + B
Plastic Molding Dies	A.S. SPECIAL HOBBING IRON Water Hardening	P1	C 0.05, Mn 0.10, Si 0.10	Water Mach. 40 Movement + C

★ Last column indicates suggested Quenching Medium; Machinability Annealed, using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Plastic Molding Dies (Hobs)	A.S. #7 Oil Hardening	S1	C 0.45, Si 0.75, Mn 0.25, Cr 1.15, W 2.55, V 0.20	Oil Mach. 75 Movement +B
Plastic Molding Dies (Hobs)	A.S. #85		C 0.55, Mn 0.40, Si 0.30, Cr 1.00, Mo 0.30, Ni 3.00	Oil Mach. 75 Movement +B
Plastic Molding Dies (Machined Cavity)	(See A.S. LUSTRE-DIE, GREEN LABEL, A.S. #5, A.S. DURAMOLD B, Listed Above)			
Punching & Shearing	(See A.S. #5, A.S. TRI-ACK, BLUE LABEL, WHITE LABEL, A.S. #7, GREEN LABEL, Listed Above)			
Shock Resisting Tools (Repeated Impact)	A.S. BEARCAT		C 0.50, Mn 0.70, Cr 3.25, Mo 1.40	Air Mach. 90 Movement +A
Shock Resisting Tools (Repeated, Intermittent Impact)	(See A.S. #7, A.S. #85, Listed Above)			

ADAMAS CARBIDE CORP., Kenilworth, N. J. — Listing No. 2

Cutting Tools (Very Fine Precision Boring & Finishing, Cast Iron, Nonferrous) ..... AAA, Carbide

Cutting Tools (Fine Precision Boring & Finishing, Cast Iron, Nonferrous) ..... AA, Carbide

Cutting Tools (General Purpose, Cast Iron, Nonferrous) ..... A, Carbide

Cutting Tools (Roughing Cuts, Cast Iron, Nonferrous) ..... B, Carbide

Cutting Tools (Heavy or Interrupted Cuts, Cast Iron, Nonferrous) ..... BB, Carbide

Cutting Tools (Precision Boring & Turning, Steel) ..... CC, Carbide

Cutting Tools (Finishing & Semifinishing, Steel) ..... C, Carbide

Cutting Tools (General Purpose, Steel) ..... D, Carbide

Cutting Tools (Heavy or Interrupted Cuts, Steel) ..... DD, Carbide

Cutting Tools (Finishing & Light Roughing, with or without Interrupted Cuts, Steel) ..... 548, Carbide

Cutting Tools (Heavy Roughing & Interrupted Cuts, Severe Conditions, Steel) ..... 434, Carbide

Cutting Tools (Shaping, Planing, Shock Applications, Steel) ..... 474, Carbide

Cutting Tools (Extremely Heavy Roughing or High Shock Interrupted Cuts, Suitable Hot Working & Removal of Hot Welding Flash) ..... GG, Carbide

Cutting Tools (Woodworking—Small Tips, Simple Form Tools) ..... A, Carbide

Cutting Tools (Woodworking—Large Tips, Intricate Forms) ..... B, Carbide

Dies (Fine Wire Drawing, Nonferrous, Coated Ferrous) ..... AAA, Carbide

Dies (Small Diameter Steel Drawing, Nonferrous Drawing Over 0.020 in., Compacting) ..... A, Carbide

Dies (Fine Wire Drawing, Light Cupping, Light Deep Drawing, Light Blanking, Compacting, Small & Medium Wire Straightening) ..... B, Carbide

Dies (Cold Drawing Steel Rods-Bars-Tubing, Deep Drawing & Cupping, Blanking, Light Heading & Cold Extrusion, Quills & Cutoff Knives, Medium & Large Wire Straightening, Tube Drawing Mandrels) ..... BB, Carbide

Dies (Lamination, Heading & Cold Extrusion, Small Nail Gripper, Large Tube Drawing Mandrels, Punches, Medium Shock Applications) ..... HD-15, Carbide

Dies (Heading, Smaller Swaging, Large Nail Gripper, Heavy Bolt Sizing & Cold Heading Hammers, Punches with Unsupported Sections, High Shock Applications) ..... HD-20, Carbide

Dies (Same Applications as HD-20 Carbide, Used Only if Galling & Seizing Is Problem) ..... HD-20-T, Carbide

Dies (Large Size Cold Heading & Swaging, Large Nail Gripper, Maximum Shock Applications) ..... HD-25, Carbide

Dies (Same Applications as HD-25 Carbide, Use Only if Galling & Seizing Is Problem) ..... HD-25-T, Carbide

Mining & Rock Drilling (All Material, Superior Shock Resistance, Excellent Wear Resistance) ..... 502, Carbide

Mining & Rock Drilling (All Applications Where Wear Resistance Is More Important than Shock Resistance) ..... 569, Carbide

Wear Resistance Parts (Superior Wear Resistance, Use Where Absolutely No Shock Encountered) ..... AAA, Carbide

Wear Resistance Parts (Excellent Wear Resistance, Use Where No Shock Encountered) ..... AA, Carbide

Wear Resistance Parts (Use Where Not Much Shock Encountered) ..... A, Carbide

Wear Resistance Parts (Use Where Light to Medium Shock & Light Impact Encountered) ..... B, Carbide

Wear Resistance Parts (Use Where Heavy Shock Encountered) ..... BB, Carbide

Wear Resistance Parts (Use Where Heavy Shock & Medium Impact Encountered) ..... HD-15, Carbide

ALLEGHENY LUDLUM STEEL CORP., 2020 Oliver Bldg., Pittsburgh 22, Pa. — Listing No. 3

Bushings (Cold Work, Forming Dies and Gages)	FC-EZ Graphitic Oil Hardening	O6	C 1.40, Cr 0.25, Mn 1.00, Si 1.40, Mo 0.25	Oil Mach. 125 Movement +A
Bushings	NITRI-CAST-IRON		C 2.70, Mn 0.60, Si 2.65, Cr 1.00, Mo 0.23, N 0.98	Expands When Nitrided
Bushings (Cold Work, Forming Dies and Gages)	OILGRAPH Graphitic Oil Hardening	O6	C 1.35, Mn 1.00, Cr 0.25, Mo 0.25, Si 1.35	Oil Mach. 125 Movement +A
Bushings (Pneumatic Chisels, Air Gun Bushings)	LUDLUM 602 Water, Oil Hardening	S5	C 0.50, Mn 0.70, Mo 0.40, V 0.10, Si 1.70	Water, Oil Mach. 85 Movement —C
Carbon Drills, Reamers	CROW Water Hardening	W5	C 1.20, Mn 0.25, Cr 0.50, Si 0.25	Water Mach. 100 Movement —C
Cold Forming Dies	CARMET CA-12, Carbide			
Cold Header Dies	CARMET CA-11, Carbide			
Cold Header Dies	CARMET CA-225, Carbide			
Cold Header Dies	POMPTON Water Hardening	W1	C 0.90-1.00	Water Mach. 100 Movement —C
Cold Header Dies	PYTHON Water Hardening	W2	C 0.90, Mn 0.30, V 0.25, Si 0.25	Water Mach. 85 Movement —C
Cold Work (Dies, Rolls, Cams, etc.)	ALHEAD Water Hardening		C 1.00, W 1.50, Co 1.50	Water Mach. 80 Movement C
Cold Work (Dies, Rolls, Cams, etc.)	FC Air Hardening Cast-to-Shape Air Hardening	D2	C 1.50, Mn 0.40, Cr 12.00, Mo 0.90, V 0.50, Co 0.75, Si 0.40, N 0.25	Air Mach. 50 Nonshrink
Cold Work (Dies, Rolls, Cams, etc.)	FC Air Hardening Forging Air Hardening	D2	C 1.50, Mn 0.40, Cr 12.00, Mo 0.90, V 0.50, Co 0.75, Si 0.40, Ni 0.25	Air Mach. 50 Nonshrink
Cold Work (Dies, Rolls, etc.)	FC ROLOY Cast-to-Shape Air Hardening	D2	C 1.50, Mn 0.40, Cr 12.00, Mo 1.20, V 0.50, Co 0.75, Si 0.40	Air Mach. 50 Nonshrink
Cold Work (Dies, Rolls, Cams, etc.)	FC 66 Cast-to-Shape Air Hardening	D5	C 1.50, Mn 0.40, Cr 12.00, Mo 0.90, V 0.50, Co 3.25, Si 0.40, N 0.35	Air Mach. 50 Nonshrink
Cold Work (Dies, Rolls, Cams, etc.)	FC 66 Forgings Air Hardening	D5	C 1.50, Mn 0.40, Cr 12.00, Mo 0.90, V 0.50, Co 3.25, Si 0.40, N 0.35	Air Mach. 50 Nonshrink
Cold Work Dies	AIRLOY Air Hardening	A5	C 1.00, Mn 3.00, Cr 1.00, Mo 1.00, Si 0.25	Air Mach. 60 Movement +A
Cold Work Dies (Blanking)	CARMET CA-10, Carbide			
Cold Work Dies (Blanking)	CARMET CA-11, Carbide			
Cold Work Dies (Blanking, Long Runs)	HURON Oil Hardening	D3	C 2.00, Mn 0.25, Cr 12.00, V 0.80, Si 0.25	Oil Mach. 45 Movement +A

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Cold Work Dies (Brick Molds)	HURON V Air, Oil Hardening	D7	C 2.50, Cr 12.00, Mo 0.80, V 4.00	Air, Oil Mach. 40 Movement A
Cold Work Dies (Blanking, Forming)	FC ROLOY #2 Cast-to-Shape Air Hardening	A2	C 1.00, Mn 0.35, Cr 5.00, Mo 1.15, V 0.50, Si 0.35	Air Mach. 65 Movement A
Cold Work Dies (Blanking, Forming)	UTICA Water, Oil Hardening	O7	C 1.25, Mn 0.30, Cr 0.40, W 1.40, V 0.20, Si 0.35	Oil, Water Mach. 65 Movement + A
Cold Work Dies (Blanking, Forming, Long Runs)	ONTARIO Air Hardening	D5	C 1.50, Mn 0.35, Cr 12.00, Mo 0.80, V 0.25, Si 0.30	Air Mach. 50 Movement + A
Cold Work Dies (Blanking, Forming, Short Runs)	DEWARD Oil Hardening	O2	C 0.90, Mn 1.50, Mo 0.30, Si 0.25	Oil Mach. 90 Movement + A
Cold Work Dies (Blanking, Forming, Short Runs)	SAGAMORE Air Hardening	A2	C 1.00, Mn 0.50, Cr 5.00, Mo 1.00, V 0.25, Si 0.25	Air Mach. 65 Movement A
Cold Work Dies (Blanking, Forming, Short Runs)	SARATOGA Oil Hardening	O1	C 0.90, Mn 1.20, Cr 0.50, W 0.50, Si 0.35	Oil Mach. 85 Movement + A
Cold Work Dies (Blanking, Forming, Jigs & Fixtures)	TIOGA Oil Hardening	L6	C 0.70, Mn 0.60, Si 0.25, Cr 0.65, Ni 1.50, Mo 0.15	Oil Mach. 75 Movement + B
Cold Work Dies (Inserts, Machine Parts)	FC CAST TOOL STEEL	W1	C 0.90, Mn 0.35, Si 0.30	Should Not Be Hardened Mach. 90
Cold Work Dies (& Machine Parts)	FC FLAMHARD Cast-to-Shape SAE 4150 Oil Hardening		C 0.50, Mn 1.15, Cr 1.20, Mo 0.40, V 0.12, Si 0.50	Oil Mach. 85 Movement B
Cold Work Dies (& Machine Parts)	FC CMS CAST-TO-SHAPE. SAE 4160 + Mo Air, Oil Hardening		C 0.60, Mn 0.70, Si 0.40, Cr 1.00, Ni 0.45, Mo 0.40, V 0.10	Oil Mach. 85 Movement B
Cold Work Dies (& Machine Parts)	FC 1 CAST-TO-SHAPE SAE 3150 Oil Hardening		C 0.50, Mn 0.55, Si 0.35, Cr 1.00, Ni 1.65	Oil Mach. 85 Movement B
Cold Work Dies (Brick Molds, Blanking, Forming)	SAGAMORE V	A7	C 2.40, Cr 5.00, Mo 1.00, V 4.25	Air Mach. 50 Movement A
Cold Work Dies (Forming, Very Long Runs)	OTTAWA 60		C 3.25, Cr 1.00, Mo 1.00, V 12.00	Oil or Air Mach. 35 Movement A
Cutting Tools (Finishing)	ALX Cast Alloy		C 2.00, Cr 33.00, W 17.00, Co 42.00, Mo 0.70, B 0.90	No Heat Treat Grind Only
Cutting Tools (Finishing—Cast Iron, Nonferrous, Nonmetallics)	CARMET CA-4, Carbide			
Cutting Tools (Finishing—Nonferrous, Nonmetallics)	CARMET CA-7, Carbide			
Cutting Tools (Finishing—Nonferrous, Nonmetallics)	CARMET CA-8, Carbide			
Cutting Tools (Finishing Steel)	CARMET CA-606, Carbide			
Cutting Tools (Finishing Steel)	CARMET CA-711, Carbide			
Cutting Tools (Heavy Rough Cuts—Cast Iron)	CARMET CA-51, Carbide			
Cutting Tools (Precision Finishing Steel)	CARMET CA-704, Carbide			
Cutting Tools (Roughing)	PANTHER SPECIAL High Speed	T4	C 0.75, Mn 0.25, Cr 4.00, W 19.00, V 1.00, Co 5.00, Si 0.25	Oil, Air Mach. 45 Movement + A
Cutting Tools (Roughing)	PANTHER 5	T15	C 1.50, Cr 4.75, W 12.50, V 5.00, Co 5.00	Oil, Air, Salt Mach. 40 Movement A
Cutting Tools (Roughing)	SUPER DBL High Speed	M36	C 0.80, Mn 0.40, Cr 4.00, W 5.50, Mo 4.25, V 1.75, Co 7.75, Si 0.40	Oil, Air Mach. 45 Movement + A
Cutting Tools (Roughing)	SUPER PANTHER High Speed	T5	C 0.80, Mn 0.25, Cr 4.00, W 19.00 Mo 0.75, V 2.00, Co 7.00, Si 0.25	Oil, Air Mach. 45 Movement + A
Cutting Tools (Roughing—Cast Iron, Nonferrous, Nonmetallics)	CARMET CA-3, Carbide			
Cutting Tools (Heavy Interrupted Roughing)	CARMET CA-610, Carbide			
Cutting Tools (Roughing Steel)	CARMET CA-720, Carbide			
Cutting Tools (Roughing, Finishing)	DBL-2 High Speed	M2	C 0.80, Mn 0.25, Cr 4.00, W 6.00, Mo 5.00, V 1.75, Si 0.30	Oil, Air Mach. 55 Movement + A
Cutting Tools (Roughing, Finishing)	DBL-2½ High Speed	M3 (Class 1)	C 1.00, Cr 4.00, W 6.25, Mo 6.25, V 2.50	Oil, Air, Salt Mach. 45 Movement A
Cutting Tools (Roughing, Finishing)	DBL-3	M3 (Class 2)	C 1.15, Cr 4.00, W 6.00, Mo 5.50, V 3.00	Oil, Air, Salt Mach. 45 Movement A
Cutting Tools (Roughing, Finishing)	LMW High Speed	M1	C 0.80, Mn 0.25, Cr 4.00, W 1.50, Mo 8.00, V 1.00, Si 0.30	Oil Mach. 55 Movement + A
Cutting Tools (Roughing, Finishing)	LXX High Speed	T1	C 0.70, Mn 0.25, Cr 4.00, W 18.00, V 1.00, Si 0.25	Oil, Air Mach. 50 Movement + A
Cutting Tools (Roughing, Finishing)	ML High Speed	T2	C 0.80, Mn 0.30, Cr 4.00, W 18.00, Mo 0.75, V 2.00, Si 0.30	Oil, Air Mach. 45 Movement + A
Cutting Tools (Roughing, Finishing)	VLM High Speed	M10	C 0.85, Mn 0.30, Cr 4.00, Mo 8.00, V 2.00, Si 0.30	Oil Mach. 55 Movement + A
Diecasting Dies	POTOMAC A	H11	C 0.40, Mn 0.30, Si 0.90, Cr 5.00, Mo 1.30, V 0.50	Oil, Air Mach. 70 Movement A
Diecasting Dies	POTOMAC M Oil, Air Hardening	H13	C 0.40, Mn 0.35, Si 1.00, Cr 5.00, Mo 1.00, V 1.00	Oil, Air Mach. 70 Movement —A
Draw Dies	(See CROW, Listed Above)			
Draw Dies	(See ONTARIO, Listed Above)			
Extrusion Dies & Swaging Dies	ALX-6		C 1.00, Mn 0.25, Si 0.25, Cr 33.50, W 6.00, Co 59.00	No Heat Treat
Gages	CARMET CA-3, Carbide			
Gages	CARMET CA-4, Carbide			
Gages	CARMET CA-815, Chrome Carbide			

★ Last column indicates suggested Quenching Medium; Machinability Annealed, using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Gages	DEWARD (Listed Above)			
Gages	ONTARIO (Listed Above)			
General Purpose Carbon Tool Steel (Not subject to test)	CORINTH Water Hardening		Straight Carbon	Water Mach. 100 Movement —C
General Purpose Carbon Tool Steel	POMPTON (Listed Above)			
High Stress, High Wear Machine Parts & Hot Forming (Short Run)	FC CMS Cast-to-Shape Oil Hardening		C 0.60, Mn 0.70, Cr 1.00, Mo 0.40, V 0.10, Si 0.40, Ni 0.45	Oil or Air Mach. 85 Movement B
High Wear Machinery Parts, Liners	FC Nitri-Cast-Iron		C 2.70, Cr 1.00, Mn 0.60, Si 2.65, Mo 0.23, Al 0.98	Not Hardened, Nitride Only
Hot Work Dies (Brass & Aluminum Extrusion)	CARMET CA-815 (Listed Above)			
Hot Work Dies (Hot Forming)	ATLAS A Oil, Air Hardening	H21	C 0.30, Mn 0.30, Cr 3.00, W 9.00, V 0.50, Si 0.25	Oil, Air Mach. 70 Movement + B
Hot Work Dies (Hot Forming)	ATLAS B Oil, Air Hardening	H22	C 0.40, Mn 0.30, Cr 3.00, W 11.50, V 0.50, Si 0.25	Oil, Air Mach. 70 Movement + B
Hot Work Dies (Hot Forming)	FC 5X1 Cast-to-Shape Oil, Air Hardening	H12	C 0.32, Mn 0.35, Cr 5.00, W 1.35, Mo 1.35, V 0.25, Si 1.05	Oil or Air Mach. 70 Movement B
Hot Work Dies (Hot Forming Gen'l Purpose Hot Work)	POTOMAC Oil, Air Hardening	H12	C 0.32, Mn 0.30, Cr 5.00, W 1.25, Mo 1.50, V 0.25, Si 0.90	Oil, Air Mach. 70 Movement A
Hot Work Dies (Hot Forming)	(See POTOMAC A, Listed Above)			
Hot Work Dies (Hot Forming Extrusion Liners)	FC 5X1 Castings	H12	C 0.33, Mn 0.35, Cr 5.00, W 1.37, Mo 1.35, V 0.25, Si 1.00	Oil, Air Mach. 60 Movement —A
Hot Work Dies (Hot Forming Extrusion Liners)	FC 14 Forgings Oil, Air Hardening	H21	C 0.35, Mn 0.25, Cr 4.00, W 9.75, V 0.25, Si 0.20	Oil or Air Mach. 70 Movement A
Hot Work Dies (Hot Forming Extrusion Liners)	FC #19 Forgings	H14	C 0.30-0.40, Cr 4.00-5.50, Mn 0.25-0.40, Si 1.25-1.75, W 3.75-4.25, V 0.20-0.35	Oil Mach. 70
Hot Work Dies (Hot Forming Extrusion Liners)	5X1-V	H13	C 0.40, Mn 0.35, Mo 1.25, V 1.00, Cr 5.00, Si 1.00	Oil, Air Mach. 60 Movement A
Hot Work Dies (Hot Forming Extrusion Liners)	5X1-Special	H21	C 0.33, Cr 2.75, Mn 0.30, V 0.30, Si 0.30, In 9.75, Ni 1.75, Mo 0.25	Oil, Air Mach. 45 Movement A
Hot Work Dies (Hot Punching)	SEMINOLE MEDIUM Oil Hardening	S1	C 0.42, Mn 0.30, Cr 1.30, W 2.00, V 0.25, Si 0.25	Oil Mach. 85 Movement + B
Hot Work Dies (Hot Punching, Shearing)	EB ALLOY Oil, Air Hardening		C 0.75, Mn 0.30, Cr 3.75, Mo 0.50, V 0.35, Si 0.25	Oil, Air Mach. 75 Movement + B
Hot Work Dies (Hot Punching, Shearing)	MOHAWK Oil, Air Hardening	H25	C 0.45, Mn 0.30, Cr 3.50, W 14.00, V 0.70, Si 0.30	Oil, Air Mach. 60 Movement + A
Hot Work Dies (Hot Forming, Punching)	B-47	H19	C 0.40, Cr 4.25, W 4.25, Co 4.25, V 2.25, Mo 0.40	Oil, Air Mach. 65 Movement A
Plastic Mold Die Hubs	LUDLUM 609	S5	C 0.60, Mn 0.80, Cr 0.25, Mo 0.25, V 0.20, Si 2.00	Oil, Water Mach. 80 Movement —C
Plastic Mold Die Hubs	SEMINOLE HARD Oil Hardening	S1	C 0.52, Mn 0.30, Cr 1.30, W 2.00, V 0.25, Si 0.90	Oil Mach. 85 Movement + B
Plastic Mold Die Hubs	ONTARIO, SAGAMORE (Listed Above)			
Shock Resisting (General Purpose)	SEMINOLE HARD Oil Hardening	(Listed Above)		
Shock Resisting (Intermittent Impact)	ATLAS 93 Oil Hardening		C 0.55, Mn 0.55, Cr 0.70, Mo 0.40, Si 0.20	Oil Mach. 90 Movement + B
Shock Resisting (Intermittent Impact) (Punching & Shearing)	LUDLUM 609 Water, Oil Hardening	(Listed Above)		
Shock Resisting (Intermittent Impact)	PYTHON	(Listed Above)		
Shock Resisting (Repeated Impacts)	LUDLUM 602	(Listed Above)		

AMALGAMATED STEEL CORP., Broadway & Wire Ave., Cleveland 5, Ohio — Listing No. 4

Cold Work Dies (Blanking, Cold Forming)	MAL-DIE Air Hardening	A2	C 1.00, Mn 0.60, Cr 5.25, V 0.25, Mo 1.10	Air
Diecasting Dies	KROPUNCH Air Hardening		Special Analysis	Air
Diecasting Dies	KROTUNG Air Hardening	H12	C 0.33, Cr 4.75, W 1.30, Mo 1.50, V 0.25, Si 0.90	Air
Dies, Tools	DYKROME Air Hardening	D2	C 1.50, Cr 11.50, Mo 0.75, V 0.25	Air
Dies, Tools	DYMAL Oil Hardening	O1	C 0.90, Mn 1.15, Cr 0.50, W 0.50	Oil
Gages	(See DYMAL, Listed Above)			
General Use—Toolroom	T.R.S. Water, Oil Hardening		Special Analysis	Water, Oil
High Stress, High Wear Machinery Parts	NON-TEMPERING Water, Oil Hardening	S6A	C 0.35, Mn 0.75, Si 0.35, Cr 0.80, W 0.25, Mo 0.50	Water, Oil
High Stress, High Wear Machinery Parts	(See T.R.S., Listed Above)			
Hot Work Dies	(See KROTUNG, Listed Above)			
Hot Work Dies (Hot Punching)	SUPER SHOCK Oil Hardening	S1	C 0.50, Si 0.75, Cr 1.15, V 0.20, W 2.50	Oil
Machinery Parts	(See T.R.S., NON-TEMPERING, Listed Above)			
Plastic Molding Master Hobs	(See SUPER SHOCK, Listed Above)			
Punches, Dies, Slitters	(See KROPUNCH, Listed Above)			
Punching & Shearing	DURO-CHIP Water, Oil Hardening	S5	C 0.55, Mn 0.80, Si 2.00, V 0.20, Mo 0.45	Water, Oil
Shock Resisting Tools (Intermittent Impact)	(See NON-TEMPERING, Listed Above)			

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Shock Resisting Tools (Repeated, Intermittent Impact)	(See SUPER SHOCK, T.R.S., NON-TEMPERING, Listed Above)			
Special Purpose (Shock Resisting)	(See NON-TEMPERING, Listed Above)			

AMERICAN FELDMUEHLE CORP., 11 W. 42nd St., New York 36, N. Y. — Listing No. 5

Ceramic Cutting Tools	HIPALOX		All standard commercial squares, triangles, pentagons, for single point or milling cutters. Also available in special shapes.	

ARMSTRONG BROS. TOOL CO., 5200 W. Armstrong Ave., Chicago 30, Ill. — Listing No. 6

Cutting Tools (Finish & Light Roughing, Steel)	ARMIDE (78 Carbide)			
Cutting Tools (General Purpose Machining, Steel)	ARMIDE (78B Carbide)			
Cutting Tools (General Purpose, Cast Iron, Nonferrous)	ARMIDE (883 Carbide)			
Cutting Tools (Light Roughing & General Finishing, Steel)	ARMIDE (350 Carbide)			
Cutting Tools (Heavy Roughing of Steel)	ARMIDE (370 Carbide)			
Cutting Tools (General Purpose Roughing & Finishing of Steel, Cast Iron & Nonferrous Metals)	ARMALOY		Cast Cobalt, Chromium, Tungsten Alloy	
Cutting Tools (General Purpose)	ARMSTRONG		High Speed Steel M-2	
Cutting Tools (Roughing)	ARMSTRONG		High Speed Cobalt M-34	

ASSOCIATED STEEL CO., 4545 Hough Ave., Cleveland 3, Ohio — Listing No. 7

Abrasive & Shock Resisting Parts	KROMITE WEAR PLATE			Water
Brake Dies (Heat Treated)	KROMITE BRAKE DIE			
Cold Work Dies	MOLEX #7			Oil Movement B
Cold Work Dies	MOLEX #8			Air Movement A
Cold Work Dies	MOLEX GROUND STOCK			Air, Oil Movement A
Cutting Dies	MOLEX TUBING			Oil Movement A
Hand Tools	ALTO			Water
Heat Treated Shafting	MIRRALLOY			
High Stress Fastener	KROMITE THREADED BARS			Oil
High Stress Machine Parts (Heat Treated)	KROMITE #3			Oil Movement B
Pneumatic Tools	ALTOLOY			Oil

ATLANTIC STEEL CORP., 35-27 36th St., Astoria 6, N. Y. — Listing No. 8

Cold Work (Blanking)	ATLAN Oil Hardening	O1	C 0.90, Mn 1.15, Cr 0.50, W 0.50	Oil
Cold Work (Blanking)	ATLANTIC DIE Oil Hardening	L6	C 0.70, Mn 0.40, Cr 1.00, Si 0.20, Ni 1.65	Oil
Cold Work (Blanking)	ATLAN HCC Oil and Air Hardening	D2	C 1.50, Cr 12.00, Mo 0.80, V 1.00	Air or Oil
Cold Work Dies (Blanking, Cold Forming)	ATSCO Water Hardening	W1	C 0.75-1.10	Water
Cold Work Dies (Blanking, Cold Forming)	HARDNAIR Air Hardening	A2	C 1.00, Mn 0.65, Cr 5.00, Mo 1.10, V 0.30	Air
Cutting Tools (Roughing)	ACT CARBIDE High Speed		C 0.75, Mn 0.25, Cr 5.00, W 18.50, Mo 0.75, V 1.30, Co 11.00, Si 0.25	Oil
Punching & Shearing	ATSIL Water, Oil Hardening	S5	C 0.50, Mn 0.60, Mo 0.40, W 0.50, Si 1.35	
Punching & Shearing	TUNCRO Oil Hardening	S1	C 0.50, Mn 0.25, Cr 1.40, W 2.00, V 0.25, Si 0.25	Oil
Punching & Shearing	(See ATLANTIC DIE, ATLAN HCC, Listed Above)			
Shock Resisting	ATLANTIC 33		C 0.33, Mn 0.40, Cr 0.75, Mo 0.75, Cu 0.75, Si 0.65	Water
Special Purpose (Dies, Shock Tools)	ATLANTIC N.T. Flame Hardening		C 0.40, Mn 0.40, Cr 1.00, Mo 0.75, Cu 0.85, Si 0.65	Water or Air

★ Last column indicates suggested Quenching Medium; Machinability Annealed, using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.

ATLAS STEELS LTD., E. Main Street, Welland, Ont., Canada — Listing No. 9

Cold Work Dies (Blanking, Cold Forming)	ATLAS REFINED 10 — Water Hardening	W1	C 1.00, Mn 0.25, Si 0.20	Water Mach. 100 Movement —C
Cold Work Dies (Blanking, Cold Forming)	ATLAS X10 — Water Hardening	W1	C 1.05, Mn 0.20, Si 0.20	Water Mach. 100 Movement —C
Cold Work Dies (Blanking, Cold Forming)	CRO-MO-LOY — Air Hardening	A2	C 1.00, Mn 1.00, Cr 5.00, Mo 1.00, V 0.25, Si 0.30	Air Mach. 85 Movement +A
Cold Work Dies (Blanking, Cold Forming)	FNS — Air Hardening	D2	C 1.50, Mn 0.30, Cr 12.00, Mo 0.80, V 0.85, Si 0.30	Air Mach. 45 Movement +A
Cold Work Dies (Blanking, Cold Forming)	KEEWATIN — Oil Hardening	O1	C 0.90, Mn 1.20, Cr 0.50, W 0.50, Si 0.30, V 0.25	Oil Mach. 90 Movement +A
Cold Work Dies (Blanking, Cold Forming)	NN — Oil Hardening	D3	C 2.25, Mn 0.30, Cr 12.50, V 0.25, Si 0.25	Oil Mach. 40 Movement +A
Cold Work Dies (Blanking, Cold Forming)	NUTHERM	A6	C 0.70, Mn 2.00, Si 0.30, P 0.01, S 0.01, Cr 1.00, Mo 1.35	Air Mach. 80
Cold Work Dies (Cold Forming)	ATLAS SPEC. ALLOY 10 — Water Hardening	W2	C 1.05, Mn 0.20, V 0.20, Si 0.20	Water Mach. 100 Movement —C
Cold Work Dies (Cold Forming)	ATLAS XXX — Water Hardening	F2	C 1.35, Mn 0.30, Cr 0.35, W 3.75, Si 0.30	Water Mach. 75 Movement —C
Cold Work Dies (Cold Forming)	ATLAS XX95 — Water Hardening	W1	C 0.95, Mn 0.30, Si 0.30	Water Mach. 100 Movement —C
Cold Work Dies (Cold Forming)	ATLAS X12 — Water Hardening	W1	C 1.20, Mn 0.25, Si 0.20	Water Mach. 100 Movement —C
Cutting Tools (Finishing)	ATLAS "Q" — Water Hardening	W5	C 1.20, Mn 0.25, Cr 0.50, Si 0.20	Water Mach. 95 Movement —C
Cutting Tools (Finishing)	TROJAN — High Speed	T2	C 0.80, Mn 0.25, Cr 4.00, W 18.50, Mo 0.50, V 2.00, Si 0.30	Oil, Air Mach. 45 Movement +A
Cutting Tools (Finishing)	(See ATLAS X12, ATLAS XXX, Listed Above)			
Cutting Tools (Roughing)	MOHICAN-8 — High Speed	M1	C 0.80, Mn 0.25, Cr 4.00, W 1.50, Mo 9.00, V 1.20, Si 0.30	Oil, Air Mach. 55 Movement +A
Cutting Tools (Roughing)	NIPIGON — High Speed	T5	C 0.78, Mn 0.25, Cr 4.00, W 19.00, Mo 0.80, V 2.00, Co 8.00, Si 0.30	Oil, Air Mach. 45 Movement +A
Cutting Tools (Roughing)	SABRE		C 1.25, Mn 0.30, Si 0.30, W 10.00, Cr 4.25, Mo 2.50, V 4.30, Co 5.50	Oil, Air Mach. 45 Movement A
Cutting Tools (Roughing)	SIXIX — High Speed	M2	C 0.82, Mn 0.25, Cr 4.00, W 6.50, Mo 5.00, V 2.00, Si 0.30	Oil, Air Mach. 55 Movement +A
Cutting Tools (Roughing)	SPARTAN 7 — High Speed	T1	C 0.72, Mn 0.25, Cr 4.00, W 18.00, V 1.20, Si 0.30	Oil, Air Mach. 50 Movement +A
Cutting Tools (Roughing & Finishing)	ATLAS M-3	M3	C 1.10, Mn 0.30 max, Cr 4.25, W 6.00, Mo 5.00, V 3.00, Si 0.30 max	Oil, Air Mach. 50 Movement A
Cutting Tools (Roughing & Finishing)	ATLAS M-4	M4	C 1.27, Mn 0.30 max, Cr 4.25, W 6.00, Mo 4.75, V 4.00, Si 0.30 max	Oil, Air Mach. 45 Movement A
Cutting Tools (Roughing & Finishing)	ATLAS M-34	M34	C 0.90, Mn 0.30, Cr 3.75, W 1.45, Mo 8.70, V 2.05, Co 8.25, Si 0.25	Oil, Air Mach. 45 Movement A
Diecasting Dies	ATLAS DIE CAST STEEL — Oil Hardening		C 0.40, Mn 0.75, Cr 0.60, Mo 0.15, Si 0.20, Ni 1.25	Oil Mach. 100 Movement B
Diecasting Dies	CRODI — Air Hardening	H12	C 0.35, Mn 0.40, Cr 5.00, Mo 1.40, V 0.40, Si 1.00	Air Mach. 75 Movement A
Diecasting Dies	HODI — Air Hardening	H21	C 0.28, Mn 0.30, Cr 3.25, W 9.50, V 0.40, Si 0.30	Oil, Air Mach. 70 Movement +A
Diecasting Dies	RED INDIAN — Air Hardening	H14	C 0.35, Mn 0.30, Cr 5.00, W 4.50, Mo 0.30, V 0.30, Co 0.50, Si 1.00	Air Mach. 75 Movement A
Diecasting Dies	SENECA — Oil, Air Hardening	H21	C 0.35, Mn 0.30, Cr 3.25, W 9.50, V 0.40, Si 0.30	Oil, Air Mach. 70 Movement +A
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	CROVAN	H13	C 0.35, Mn 0.45, Cr 5.00, Mo 1.40, V 0.90, Si 1.00	Air Mach. 75 Movement A
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	HW-7		C 0.45, Mn 0.75, Cr 5.00, W 3.75, Mo 1.00, V 0.50, Co 0.50, Si 1.00	Air Mach. 75 Movement A
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	MOHICAN-6	H41	C 0.62, Mn 0.25, Cr 3.75, W 1.70, Mo 8.70, V 1.00, Si 0.30	Oil, Air Mach. 60 Movement A
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	SPARTAN 5 — Oil, Air Hardening	H26	C 0.50, Mn 0.30, Cr 4.00, W 18.00, V 1.00, Si 0.30	Oil, Air Mach. 55 Movement +A
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	ULTIMO 6 — Oil, Air Hardening		C 0.55, Mn 0.55, Cr 1.00, Mo 0.75, Si 0.80, Ni 1.60	Oil Mach. 75 Movement A
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	(See CRODI, RED INDIAN, SENECA, Listed Above)			
Plastic Molding Dies (Ejector Pins)	FALCON 6 — Oil Hardening	S1	C 0.55, Mn 0.25, Cr 1.50, W 2.00, V 0.25, Si 0.30	Oil Mach. 80 Movement +B
Plastic Molding Dies (Ejector Pins)	MONARK 2 — Water Hardening	S5	C 0.60, Mn 0.75, Cr 0.30, Mo 0.20, Si 2.00	Oil Mach. 80 Movement —B
Plastic Molding Dies (Ejector Pins)	(See ATLAS X-12, Listed Above)			
Plastic Molding Dies (Hubs)	(See CRO-MO-LOY, FALCON 6, FNS, KEEWATIN, MONARK 2, NN, NUTHERM, Listed Above)			
Plastic Molding Dies (Hubbed Cavity Dies)	IMPACTO — Water Hardening	4620	C 0.16, Mn 0.50, Mo 0.25, Si 0.20, Ni 1.75	Oil Movement —B
Plastic Molding Dies (Machine Cut Cavities)	SUPERIMPACTO — Oil Hardening	4815	C 0.12, Mn 0.50, Cr 1.50, Si 0.20, Ni 3.75	Oil Mach. 100 Movement —B
Plastic Molding Dies (Machine Cut Cavities)	(See CRO-MO-LOY, KEEWATIN, Listed Above)			
Punching & Shearing	ATLAS REFINED 8 — Water Hardening	W1	C 0.80, Mn 0.25, Si 0.20	Water Mach. 100 Movement —C
Punching & Shearing	FALCON 4 — Oil Hardening	S1	C 0.45, Mn 0.25, Cr 1.50, W 2.00, V 0.25, Si 0.30	Oil Mach. 80 Movement +B

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Punching & Shearing	(See ATLAS XXX, ATLAS X10, FALCON 6, FNS, MONARK 2, NN, ULTIMO 6, Listed Above)			
Shock Resisting (Intermittent Impact)	ATLAS ALPHA 8 Water Hardening		C 0.80, Mn 0.25, Si 0.20, Cr-W-Mo-V higher than normal residuals	Water Mach. 100 Movement —C
Shock Resisting (Intermittent Impact)	MAPLE LEAF Water Hardening	W1	C 0.80, Mn 0.30, Si 0.25, Cr-W-Mo-V higher than normal residuals	Water Mach. 100 Movement —C
Shock Resisting (Punches, Pneumatic Tools)	MONARK 1	S2	C 0.50, Mn 0.40, Mo 0.45, Si 1.10	Water, Oil Mach. 85 Movement B
Shock Resisting (Repeated Impact)	ATLAS SPECIAL ALLOY 8 Water Hardening	W2	C 0.80, Mn 0.20, V 0.20, Si 0.20	Water Mach. 100 Movement —C
Shock Resisting (Repeated Impact)	(See ATLAS REFINED 8, FALCON 4, FALCON 6, MONARK 2, Listed Above)			

BEDFORD TOOL & FORGE CO., 22 Interstate St., Bedford, Ohio — Listing No. 10

Shock Resisting	BEDCO ALLOY	S5	C 0.55, Mn 1.00, Si 2.00, Mo 0.40, V 0.35	Water, Oil, Air Blast, Still Air Mach. 50 Movement C
Shock Resisting (Hot or Cold Work in Pneumatic Chisel Form for Hot or Cold Chipping Work)	BEDCO M-2	M2	C 0.85, Mn 0.30, Si 1.30, Cr 4.15, V 1.95, W 6.40, Mo 5.00	Air, Oil, Salt Movement + A
Shock Resisting (Hot or Cold Work in Pneumatic Chisel Form for Hot or Cold Chipping Work)	BEDCO T-1	T1	C 0.75, Mn 0.30, Si 1.30, V 1.15, W 18.00, Cr 4.00	Air, Oil, Salt Movement + A
Shock Resisting	BTF ALLOY	S5	C 0.55, Mn 1.00, Si 2.00, Mo 0.35, Cr 0.30	Water, Oil, Air Blast, Still Air Mach. 50 Movement C

BETHLEHEM STEEL CO., 701 E. Third St., Bethlehem, Pa. — Listing No. 11

Blacksmithing Tools	SOLID DRILL Water, Oil Hardening	W1	C 0.75, Mn 0.20, Si 0.15	Water, Oil Movement ±B
Cold Work Dies (Blanking, Cold Forming)	A-H5 Air Hardening	A2	C 1.00, Mn 0.60, Cr 5.25, Mo 1.10, V 0.25	Air Mach. 70 Movement + A
Cold Work Dies (Blanking, Cold Forming)	AIR-4 Air Hardening	A4	C 0.95, Mn 2.00, Cr 2.20, Mo 1.10 (Lead Added)	Air Mach. 90 Movement + A
Cold Work Dies (Blanking, Cold Forming)	BTR Oil Hardening	O1	C 0.90, Mn 1.20, Cr 0.50, W 0.50, V 0.20	Oil Mach. 90 Movement + B
Cold Work Dies (Blanking, Cold Forming)	BEST Water Hardening	W2	C 0.75-1.10, V 0.15-0.25	Water Mach. 100 Movement + C
Cold Work Dies (Blanking, Cold Forming)	LEHIGH H Air Hardening	D2	C 1.55, Cr 11.50, Mo 0.80, V 1.00	Air Mach. 50 Movement + A
Cold Work Dies (Blanking, Cold Forming)	LEHIGH L Air Hardening	D1	C 0.85, Cr 11.50, Mo 0.45, V 0.30 Ni 1.00	Oil, Air Mach. 50 Movement ±A
Cold Work Dies (Blanking, Cold Forming)	LEHIGH S Oil Hardening	D3	C 2.05, Cr 11.50, V 0.60	Oil Mach. 45 Movement + B
Cold Work Dies (Blanking, Cold Forming)	SUPERIOR Water Hardening	W2	C 0.80-1.35, V 0.15-0.25	Water Mach. 100 Movement + C
Cold Work Dies (Blanking, Cold Forming)	X Water Hardening	W1	C 0.75-1.10	Water Mach. 100 Movement + C
Cold Work Dies (Blanking, Cold Forming)	XX Water Hardening	W1	C 0.90-1.30	Water Mach. 100 Movement + C
Cold Work Dies (Blanking, Cold Forming)	XCL Water Hardening	W1	C 0.80-1.20	Water Mach. 100 Movement + C
Cutting Tools (Finishing)	HM High Speed	M1	C 0.78, Cr 3.90, W 1.60, Mo 8.50, V 1.05	Oil, Air Mach. 65 Movement ±A
Cutting Tools (Roughing, Finishing)	M-10 High Speed	M10	C 0.87, Cr 4.00, Mo 8.35, V 2.05	Oil, Air Mach. 60 Movement ±A
Cutting Tools (Roughing, Finishing)	SPECIAL HS High Speed	T1	C 0.73, Cr 4.00, W 18.00, V 1.10	Oil, Air Mach. 60 Movement ±A
Cutting Tools (Roughing, Finishing)	66HS High Speed	M2	C 0.83, Cr 4.15, W 6.35, Mo 5.00, V 1.90	Oil, Air Mach. 75 Movement ±A
Cutting Tools (Roughing, Finishing)	66S High Speed	M25	C 0.83, S 0.15, W 6.35, Mo 5.00, Cr 4.15, V 1.90, S 0.15	Oil, Air Mach. 75 Movement ±A
Cutting Tools (Stone Drilling)	BROACHING & CHANNELLER Water Hardening		C 0.80, Mn 0.35, Si 0.25	Water Movement + C
Diecasting Dies	CROMO-V Air Hardening	H11	C 0.40, Cr 5.00, Mo 1.30, V 0.50, Si 0.90	Air Mach. 75 Movement + A
Diecasting Dies	CROMO-HIGH V Air Hardening	H13	C 0.40, Si 1.00, Cr 5.25, Mo 1.25, V 1.05	Air Mach. 70 Movement + A
Diecasting Dies	CROMO-W Air Hardening	H12	C 0.35, Cr 5.15, W 1.55, Mo 1.65, Si 1.05	Air Mach. 70 Movement + A
Diecasting Dies	CROMO-WV Air Hardening	H12	C 0.37, Si 1.00, Cr 5.00, Mo 1.45, W 1.25, V 0.35	Air Mach. 70 Movement + A
Diecasting Dies	MULTIMOLD Oil Hardening	P20	C 0.35, Mn 0.70, Cr 0.80, Mo 0.30, Si 0.45	Oil Mach. 80 Movement + B
Diecasting Dies	57 HW Air Hardening	H21	C 0.35, Cr 3.25, W 9.35, V 0.50	Air Mach. 65 Movement + A
Diecasting Dies	57 SPECIAL Air Hardening	H24	C 0.42, Cr 3.50, W 14.00, V 0.30	Air Mach. 60 Movement + A
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	HW8 Air Hardening	H43	C 0.60, Cr 3.60, Mo 8.50, V 1.75	Air Mach. 65 Movement + A
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	SPECIAL HS-55	H26	C 0.55, Cr 4.00, W 18.00, V 1.10	Oil or Air Mach. 65 Movement ±A
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	(See CROMO-V, CROMO-W, 57 HW, 57 SPECIAL, Listed Above)			
Plastic Molding Dies (Hubbed Cavity)	DURAMOLD A Air Hardening	P4	C 0.07, Mn 0.35, Cr 4.50, Mo 0.50, Si 0.20	Air Mach. 60 Movement + A

★ Last column indicates suggested Quenching Medium; Machinability Annealed, using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. * % Machinability Annealed Movement in Hardening.
Plastic Molding Dies (Hubbed Cavity)	DURAMOLD B Oil Hardening	P2	C 0.06, Mn 0.30, Cr 0.95, Mo 0.25, Si 0.15 (Boron Added)	Oil Mach. 50 Movement +B
Plastic Molding Dies (Machined Cavity)	LUSTRE-DIE Heat Treated BHN 293/331		C 0.50, Mn 1.00, Si 0.30, Cr 1.10, Mo 0.25	
Plastic Molding Dies (Machined Cavity)	DURAMOLD N Oil Hardening	P6	C 0.10, Mn 0.50, Cr 1.50, Si 0.25, Ni 3.50	Oil Mach. 80 Movement +B
Plastic Molding Dies (Machined Cavity)	DURAMOLD NI-CR Oil Hardening	P3	C 0.10, Cr 0.60, Ni 1.25	Oil Mach. 80 Movement +B
Plastic Molding Dies (Machined Cavity)	(See BTR, A-H5, MULTIMOLD, Listed Above)			
Plastic Molding Dies (Hobs)	(See BTR, A-H5, LEHIGH H, Listed Above)			
Plastic Molding (Master Hobs)	67 CHISEL Oil Hardening	S1	C 0.50, Cr 1.25, W 2.50, V 0.20, Si 0.75	Oil Mach. 75 Movement +B
Press Brake Dies	BRAKE DIE Heat Treated BHN 248/293		C 0.50, Mn 0.90, Cr 1.00, Mo 0.20	Oil Mach. 100 Movement +B
Punching & Shearing	OMEGA Water, Oil Hardening	S5	C 0.60, Mn 0.70, Mo 0.45, V 0.20, Si 1.85	Oil, Water Mach. 65 Movement ±B
Punching & Shearing	71 ALLOY Water, Oil Hardening	S4	C 0.65, Mn 0.90, Si 2.00	Oil, Water Mach. 65 Movement ±B
Punching & Shearing	(See X, XX, XCL, BEST, BTR, A-H5, LEHIGH H, LEHIGH L, LEHIGH S, 67 CHISEL, SUPERIOR, Listed Above)			
Punching & Shearing	TOUGH M Oil Hardening	L2	C 0.45, Mn 0.55, Cr 0.95, V 0.20, Si 0.20	Oil Mach. 80 Movement +B
Shock Resisting Tools (Repeated Impact)	BEARCAT Air Hardening		C 0.50, Mn 0.70, Cr 3.25, Mo 1.40	Air Mach. 90 Movement +A
Shock Resisting Tools (Repeated Impact)	IMPERIAL Oil, Water Hardening	S2	C 0.50, Mn 0.70, Si 0.70, V 0.20, Mo 0.45	Oil, Water Mach. 75 Movement ±B
Shock Resisting Tools (Repeated, Intermittent Impact)	(See OMEGA, TOUGH M, 67 CHISEL, 71 ALLOY, Listed Above)			
Special Purpose (Cold Work Dies)	BETHALLOY Oil Hardening	L6	C 0.75, Mn 0.75, Cr 0.90, Mo 0.35, Ni 1.75	Oil Mach. 85 Movement +B
Special Purpose (Cutting Tools)	67 TAP Oil Hardening	O7	C 1.25, Cr 0.65, W 1.40, V 0.20	Oil Mach. 60 Movement +B
Special Purpose (Cutting Tools)	BFS Water Hardening	F2	C 1.30, Mn 0.28, W 3.50	Water Mach. 70 Movement +C
Special Purpose (Shock Resisting)	NON-TEMPERING Water, Oil Hardening		C 0.35, Mn 0.70 Cr 0.80, Mo 0.30, Si 0.45, Cu 0.30	Water, Oil Mach. 80 Movement ±B
Special Purpose (Shock Resisting)	PISTON Water Hardening		C 1.15, Cr 0.55, V 0.20	Water Mach. 80 Movement +C
Special Purpose (Shock Resisting & Cold Work Dies)	CROMO-W55 Air, Oil Hardening	H12	C 0.55, Mn 0.30, Si 0.90, Cr 5.10, Mo 1.45, W 1.25	Air Mach. 70 Movement +A

BLACKALLOY CO. OF AMERICA, Central Terminal Bldg., 415 Lexington Ave., New York 17, N. Y. — Listing No. 12

Cutting Tools	BLACKALLOY, Type #525		Co, W, Cr, Cb, Ta	Mach. 0

H. BOKER & CO. INC., 101 Duane St., New York 7, N. Y. — Listing No. 13

Blanking & Forming Dies	KINITE (Air Hardening) In Rolled, Bars & Casting Form		C 1.52, Mn 0.54, Cr 12.74, Mo 0.98, V 0.60, Co 0.57, Si 0.47	Air (High Speed) Movement A
Cutting Tools	NOVO SUPERIOR High Speed		C 0.72, Mn 0.24, Cr 4.14, W 18.36, V 1.08, Si 0.27	Oil (High Speed) Movement A
Cutting Tools	TWIN MO High Speed		C 0.84, Si 0.25, Mn 0.25, Cr 4.15, W 6.40, Mo 5.00, V 1.90	Oil (High Speed)
Dies	OILWAY Oil Hardening		C 0.94, Mn 1.23, Cr 0.44, W 0.57	Oil See (*) Movement A

*Same as carbon water hardening steel.

BOYD-WAGNER CO., 1440 W. Lake St., Chicago 7, Ill. — Listing No. 14

Cold Work Dies (Blanking, Stamping, Forming)	ARROW Nonshrinkable	O1	C 0.95, Mn 1.20, Cr 0.50, W 0.50, V 0.10, P 0.018, S 0.010	Oil Mach. 100 Movement A
Cold Work Dies (Blanking) (Long Run Stamping Dies, Forming Dies & Tools, Drawing Dies)	HYPRO 61 Hi C Hi Chrome	D2	C 1.50, Si 0.30, Mn 0.70, Cr 12.00, V 0.20, Mo 0.80	Air Mach. 60
Cold Work Dies (Blanking) (Lamination Dies, Knurls, Thread Rolling Dies)	HYPRO 62 Hi C Hi Chrome	D3	C 2.00, Si 0.30, Mn 0.70, Cr 13.00, W 1.20, P 0.018, S 0.010 max	Oil Mach. 60
Cold Work Dies (Embossing & Jewelers Dies)	VERY BEST Carbon	W2	C 1.00-1.10, Cr 0.10, V 0.10, P 0.018, S 0.010	Water Mach. 100 Movement A
Cold Work Dies (Extrusion Dies)	RECORD 66 M-2 High Speed	M2	C 0.83, Cr 4.20, Mo 5.00, W 6.25, V 1.90, Si 0.30, Mn 0.25	Oil Mach. 62
Cold Work Dies (Cold Forming) (Small Tools, Stamping Dies, Swaging, Heading)	BEST Carbon	W1	C 1.00, Si 0.20, Mn 0.30, P 0.018 max, S 0.010	Water Mach. 100 Movement A
Cutting Tools (Finishing) (Pulverizing & Slitting Cutters, Forming, Bending, Trimming)	(See HYPRO 62, Listed Above)			
Cutting Tools (For Tools of High Cutting Ability, Abrasion Resistant, High Temperature Use)	RECORD SUPERIOR High Speed	T1	C 0.70, Cr 4.00, W 18.00, V 1.00	Oil Mach. 62
Cutting Tools (Woodcutting & Turning, Flat Drills, Reamers, Planners, Taps, End Mills)	(See RECORD 66, VERY BEST, Listed Above)			

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Gages	(See HYPRO 62, Listed Above)			
Gages (Master Too's & Dies)	HI-DI 5 Nonshrinking	A2	C 1.00, Mn 0.70, Cr 5.20, Mo 1.10, V 0.20, P 0.018, S 0.010	Air Mach. 65 Movement A
High Stress, High Wear Machinery Parts. (Collets, Lathe Centers, Parts)	(See BEST, Listed Above)			
Hot Work Dies (Bolt & Gripper Dies, Header & Trimmer, Punches & Shear Blades)	CROMO-W	H12	C 0.33, Si 1.05, W 1.55, Mo 1.65, Cr 5.00	Air Mach. 70
Punching & Shearing	(See HYPRO 61, HYPRO 62, Listed Above)			
Shock Resistant (Repeated Impact) (Pneumatic Tools, Shear Blades, Heavy Duty Punches, Chisels)	SPECIAL 18	S1	C 0.45, Mn 0.30, Si 1.00, Cr 1.40, Mo 0.30, W 2.40, V 0.20	Water or Oil Mach. 67 Movement A
Wear Resistant & Shock Resistant (Shear Blades, Pneumatic Tools, Caulking, Beading Tools)	DUREDGE	S5	C 0.55, Mn 0.70, Si 1.90, Mo 0.45, V 0.20	Oil Mach. 65

BRAEBURN ALLOY STEEL CORP., Braeburn, Pa. — Listing No. 15

Cold Work Dies	PRESSURDIE #16 Air Hardening		C 0.55, Si 0.90, Mn 0.35, W 1.25, Cr 5.00, Mo 1.25, V 0.20	Air Movement A
Cold Work Dies	S.O.D. Oil Hardening	O2	C 0.90, Mn 1.65	Oil Movement A
Cold Work Dies	SPECIAL Water Hardening	W1	C 1.00, Mn 0.25, Si 0.25	Water Movement C
Cold Work Dies	SUPERIOR #2 Oil Hardening	D5	C 1.40, Cr 12.50, Mo 0.80, Co 3.50, Ni 0.50	Oil Movement A
Cold Work Dies (Blanking, Cold Forming)	†AIRQUE Air Hardening	A2	C 1.00, Mn 0.70, Cr 5.25, Mo 1.15, V 0.25, Si 0.30	Air Movement A
Cold Work Dies (Blanking, Cold Forming)	AIRQUE SPECIAL Air Hardening		C 0.80, Mn 0.70, Cr 5.25, Mo 1.15, V 0.25, Si 0.30	Air Movement A
Cold Work Dies (Blanking, Cold Forming)	†AIRQUE "V" Air Hardening		C 1.25, Mn 0.50, Si 0.30, Cr 5.25, Mo 1.15, V 1.00	Air Movement A
Cold Work Dies (Blanking, Cold Forming)	A. T. 2 Air Hardening	D4	C 2.20, Cr 12.00, V 0.25, Mo 0.90	Air Movement A
Cold Work Dies (Blanking, Cold Forming)	EXTRA Water Hardening	W1	C 1.00, Mn 0.25, Si 0.25	Water Movement C
Cold Work Dies (Blanking, Cold Forming)	KISKI Oil Hardening	O1	C 0.95, Mn 1.10, Cr 0.50, W 0.60, V 0.20, Si 0.30	Oil Movement A
Cold Work Dies (Blanking, Cold Forming)	(See S.O.D., Listed Above)			
Cold Work Dies (Blanking, Cold Forming)	SPECIAL V Water Hardening	W2	C 1.00, Mn 0.25, V 0.20, Si 0.25	Water Movement C
Cold Work Dies (Blanking, Cold Forming)	†SUPERIOR #1 Oil Hardening	D3	C 2.15, Mn 0.50, Cr 12.50, V 0.60, Si 0.30	Oil Movement A
Cold Work Dies (Blanking, Cold Forming)	†SUPERIOR #3 Oil, Air Hardening	D2	C 1.50, Mn 0.30, Cr 12.00, Mo 0.80, V 0.80, Si 0.30	Oil Movement A
Cutting Tools	BRAECUT Oil Hardening		C 1.15, Cr 4.25, V 2.25, W 5.25, Mo 6.25, Co 12.00	Oil Movement B
Cutting Tools	BRAEFOUR Oil Hardening	M4	C 1.27, Cr 4.50, V 4.00, W 5.50, Mo 4.50	Oil Movement B
Cutting Tools	†BRAEVAN 2 Oil Hardening	M3	C 1.15, Mo 5.50, W 5.60, Cr 4.00, V 3.30	Oil Movement B
Cutting Tools	COVAN Oil Hardening	M34	C 0.90, Cr 4.00, Mo 8.00, W 2.00, V 2.00, Co 8.00	Oil Movement B
Cutting Tools	MOTEMP Oil Hardening	M10	C 0.88, Cr 4.00, Mo 8.00, V 2.00	Oil Movement B
Cutting Tools	MOTUF Oil Hardening	M7	C 1.00, Cr 3.75, V 2.05, W 1.75, Mo 8.75	Oil Movement B
Cutting Tools	TWINVAN 96 Oil Hardening		C 0.96, Mn 0.25, Cr 4.25, W 18.50, Mo 0.65, V 2.10, Si 0.25	Oil Movement B
Cutting Tools (Roughing)	BONDED CARBIDE High Speed	T6	C 0.70, Mn 0.25, Cr 4.50, W 18.50, Mo 0.70, V 1.50, Co 12.00, Si 0.25	Oil Movement B
Cutting Tools (Roughing)	BONDED CARBIDE JR. High Speed	T5	C 0.77, Mn 0.25, Cr 4.25, W 18.50, Mo 0.75, V 1.95, Co 7.60, Si 0.25	Oil Movement B
Cutting Tools (Roughing)	COBALT High Speed	T4	C 0.74, Mn 0.25, Cr 4.00, W 18.00, Mo 0.50, V 1.00, Co 5.00, Si 0.25	Oil Movement B
Cutting Tools (Roughing)	†COMO High Speed	M30	C 0.77, Mn 0.25, Cr 4.00, W 1.55, Mo 8.50, V 1.20, Co 5.00, Si 0.25	Oil Movement B
Cutting Tools (Roughing, Finishing)	†BRAEMOW High Speed	M2	C 0.82, Mn 0.25, Cr 4.20, W 6.50, Mo 5.00, V 1.90, Si 0.25	Oil Movement B
Cutting Tools (Roughing, Finishing)	†BRAEVAN M-3 High Speed	M3	C 1.00, Mn 0.25, Cr 4.00, W 6.20, Mo 5.60, V 2.50, Si 0.25	Oil Movement B
Cutting Tools (Roughing, Finishing)	CONGO High Speed	M6	C 0.78, Mn 0.25, Cr 4.00, W 4.00, Mo 5.00, V 1.40, Co 12.00, Si 0.25	Oil Movement B
Cutting Tools (Roughing, Finishing)	MOCUT High Speed	M1	C 0.80, Mn 0.25, Cr 4.00, W 1.55, Mo 8.00, V 1.10, Si 0.25	Oil Movement B
Cutting Tools (Roughing, Finishing)	TWINVAN High Speed	T2	C 0.82, Mn 0.25, Cr 4.25, W 18.50, Mo 0.65, V 2.10, Si 0.25	Oil Movement B
Cutting Tools (Roughing, Finishing)	VINCO High Speed	T1	C 0.70, Mn 0.25, Cr 4.00, W 18.00, V 1.00, Si 0.25	Oil Movement B
Hot Work Dies	H.C.A. Air or Oil Hardening	H23	C 0.30, Cr 12.00, W 12.00, V 0.90	Air or Oil Movement B
Hot Work Dies	PRESSURDIE #5 Air Hardening		C 0.38, Mn 0.60, Si 1.00, Cr 3.50, V 1.00, W 1.25, Mo 1.00	Air Movement A
Hot Work Dies (Aluminum Punching & Forming)	PRESSURDIE #2 Air Hardening	H12	C 0.35, Mn 0.35, Cr 5.00, W 1.20, Mo 1.45, V 0.35, Si 1.00	Air Movement A
Hot Work Dies (Brass Extrusion Dummies)	ECONO Air Hardening		C 0.40, Cr 3.75, W 1.00, V 0.75, Mo 5.75	Air Movement A

★ Last column indicates suggested Quenching Medium; Machinability Annealed, using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Hot Work Dies (Plastic Dies & Forming)	PRESSURDIE #3-L Air Hardening	H11	C 0.39, Cr 5.50, V 0.50, Si 1.00, Mo 1.10	Air Movement A
Hot Work Dies (Punching, Forming)	PRESSURDIE "C" Air Hardening		C 0.38, Cr 4.20, W 4.20, Mo 0.50, V 2.20, Co 4.20	Air Movement A
Hot Work Dies (Punching, Forming)	PRESSURDIE #1 Air Hardening	H14	C 0.38, Mn 0.30, Cr 5.00, W 5.00, Mo 0.25, V 0.20, Co 0.50, Si 0.90	Air Movement A
Hot Work Dies (Punching, Forming)	T-ALLOY Oil, Air Hardening	H22	C 0.35, Mn 0.25, Cr 3.50, W 10.50, V 0.40, Si 0.25	Oil Movement B
Hot Work Dies (Punching, Forming)	T-ALLOY "A" Oil, Air Hardening	H21	C 0.33, Mn 0.25, Cr 3.50, W 9.60, V 0.50, Si 0.25	Oil Movement B
Hot Work Dies (Punching, Forming)	T-ALLOY "B" Oil, Air Hardening	H24	C 0.50, Mn 0.25, Cr 3.00, W 15.00, V 0.50, Si 0.25	Oil Movement B
Hot Work Dies (Punching, Forming, Diecasting)	†PRESSURDIE #3 Air Hardening	H13	C 0.39, Mn 0.30, Cr 5.50, Mo 1.10, V 1.00, Si 1.00	Air Movement A
Shock Resisting	TRITON Water Hardening	S2	C 0.50, Mn 0.35, Mo 0.60, Si 1.00	Water Movement B
Shock Resisting	VIBRO Oil Hardening	S1	C 0.50, Mn 0.25, Cr 1.40, W 1.90, V 0.25, Si 0.25	Oil Movement B

†These grades also available in the Free Machining Type.

BROWN & SHARPE MFG. CO., INDUSTRIAL PRODUCTS DIV., 235 Promenade, Providence 1, R. I. — Listing No. 16

Cold Work Dies (Blanking, Cold Forming, Also Gages, Machine Parts, Shear Blades, etc.)	READY-MARK Ground Stock	O1	C 0.90, Mn 1.20, Cr 0.50, V 0.20, W 0.50	Oil	Mach. 100 Movement A
Cold Work Dies (Blanking, Cold Forming, Also Gages, Machine Parts, Shear Blades, etc.)	READY-MARK Ground Stock	A2	C 1.00, Mn 0.60, Cr 5.25, Mo 1.10, V 0.25, Si 0.30	Air	Mach. 95 Movement A

CARBORUNDUM CO. STUPALOX PROJECT, P. O. Box 337, Niagara Falls, N. Y. — Listing No. 17

Ceramic Cutting Tools	STUPALOX		Throwaway inserts, heavy duty bottom inserts, solid inserts, unground blanks, single point tools, die blanks, wear parts & gage blanks.

CARPENTER STEEL CO., 339 W. Bern St., Reading, Pa. — Listing No. 18

Cold Work Dies (Cold Forming)	H-9 DOUBLE HEADER Water Hardening	W1 (0.90C)	C 0.90, Mn 0.40, Si 0.40	Water	Mach. 100 Movement ±C*
Cold Work Dies (Cold Forming)	SOLAR Water Hardening	S2	C 0.50, Mn 0.40, Mo 0.50, Si 1.00	Water	Mach. 75 Movement ±C*
Cold Work Dies (Blanking, Cold Forming)	HAMPDEN Oil Hardening	D3	C 2.10, Mn 0.25, Cr 12.50, Si 0.25, Ni 0.50	Oil	Mach. 50 Movement +A
Cold Work Dies (Blanking, Cold Forming)	K-W Water Hardening	F2	C 1.30, Mn 0.30, W 3.50, Si 0.30	Water	Mach. 80 Movement —C
Cold Work Dies (Blanking, Cold Forming)	HI WEAR 64 Air-Oil Hardening		C 1.50, Mn 2.00, Si 0.25, Cr 0.90, W 4.00, Mo 1.00	Air-Oil	Mach. 50 Movement +A
Cold Work Dies (Blanking, Cold Forming)	O-1	O1	C 0.90, Mn 1.30, Cr 0.50, W 0.50	Oil	Mach. 80 Movement +A
Cold Work Dies (Blanking, Cold Forming)	R.D.S. Oil Hardening	L6	C 0.70, Mn 0.35, Cr 1.00, Si 0.25, Ni 1.75	Oil	Mach. 75 Movement +A
Cold Work Dies (Blanking, Cold Forming)	STENTOR Oil Hardening	O2	C 0.90, Mn 1.60, Si 0.25	Oil	Mach. 100 Movement +A
Cold Work Dies (Blanking, Cold Forming)	VEGA-FM Air Hardening	A6	C 0.70, Mn 2.00, Cr 1.00, Mo 1.35, Si 0.30	Air	Mach. 80 Movement +A
Cold Work Dies (Blanking, Cold Forming)	HI SHOCK 60 Air Hardening		C 0.68, Mn 0.50, Si 0.30, Cr 1.00, Mo 1.00, V 0.15, Ni 0.50, Cu 2.50	Air	Mach. 80 Movement +B
Cold Work Dies (Blanking, Cold Forming)	No. 11 SPECIAL Water Hardening	W1 (1.00C)	C 1.05, Mn 0.20, Si 0.20	Water	Mach. 100 Movement ±C*
Cold Work Dies (Blanking, Cold Forming)	No. 484-FM Air Hardening	A2	C 1.00, Mn 0.0, Cr 5.00, Mo 1.00, V 0.20, Si 0.20	Air	Mach. 70 Movement +A
Cold Work Dies (Blanking, Cold Forming)	No. 610-FM Air Hardening	D2	C 1.50, Mn 0.30, Cr 12.00, Mo 0.80, V 0.90, Si 0.30	Air	Mach. 50 Movement +A
Cutting Tools (Roughing, Finishing)	GOLD STAR High Speed Bits	T8	C 0.77, Cr 3.75, W 13.75, Co 5.00, V 2.00		
Cutting Tools (Finishing)	(See K-W, Listed Above)				
Cutting Tools (Roughing, Finishing)	SPEED STAR High Speed, Hot Work Tool Steel	M2	C 0.82, Mn 0.25, Cr 4.25, W 6.25, Mo 5.00, V 1.90, Si 0.25	Oil	Mach. 45 Movement +A
Cutting Tools (Roughing, Finishing)	STAR BORON High Speed Bits	M40	C 0.55, Cr 4.25, W 1.75, V 1.75, Mo 8.50, Co 8.00, B 0.50		
Cutting Tools (Roughing, Finishing)	STAR-ZENITH High Speed, Hot Work Tool Steel	T1	C 0.72, Mn 0.25, Cr 4.00, W 18.25, V 1.15, Si 0.20	Oil	Mach. 45 Movement +A
Diecasting Dies (Hubbed Cavity Dies)	SUPER SAMSON	P4	C 0.10, Mn 0.30, Cr 5.00, Mo 0.90, V 0.25, Si 0.20	Oil, Air	Mach. 70 Movement ±A
Diecasting Dies	No. 883 Hot Work Tool Steel	H13	C 0.40, Mn 0.35, Cr 5.00, Mo 1.35, V 0.90, Si 1.10	Oil, Air	Mach. 65 Movement ±B*
Diecasting Dies (Ejector Pins)	(See No. 883, Listed Above)				
Gages	T.G.S. Oil Hardening		C 0.20, Mn 1.30, Si 0.20	Oil	Mach. 100 Movement +A
Gages	(See HAMPDEN, No. 11 SPECIAL, No. 484, No. 610, STENTOR, O-1, Listed Above)				

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
High Stress, High Wear Machinery Parts	(See T.G.S., R.D.S., Listed Above)			
High Stress, High Wear Machinery Parts	No. 481 Collet Steel	S5	C 0.60, Mn 0.80, Si 1.90, Mo 0.30, Cr 0.30	Oil Mach. 70 Movement +A
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	STAR-ZENITH Low Carbon	H26	C 0.40, Cr 4.00, W 18.00, V 1.00	Oil Mach. 45 Movement +A
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	T-K Hot Work Tool Steel	H21	C 0.35, Mn 0.30, Cr 3.50, W 9.00, V 0.40, Si 0.30	Oil, Air Mach. 55 Movement ±B*
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	No. 345 Hot Work Tool Steel	H12	C 0.35, Mn 0.45, Cr 5.00, W 1.25, Mo 1.50, V 0.25, Si 1.00	Oil, Air Mach. 65 Movement ±B*
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	(See No. 883, Listed Above)			
Hot Work Dies (Hot Punching, Hot Shearing)	(See SPEED STAR, STAR-ZENITH, Listed Above)			
Plastic Molding Dies (Ejector Pins)	(See No. 11 SPECIAL, SOLAR, STENTOR, O-1, Listed Above)			
Plastic Molding Dies (Hubs)	VEGA MOLD STEEL			
Plastic Molding Dies (Hubbed Cavity Dies)	MIRROMOLD Water Hardening	P1	C 0.10, Mn 0.20, V 0.10	Water Movement ±B*
Plastic Molding Dies (Machine Cut Cavity Dies)	No. 158 Oil Hardening	P6	C 0.10, Mn 0.50, Cr 1.50, Ni 3.50, Si 0.20	Oil, Air Movement +B, +A
Plastic Molding Dies (Machine Cut Cavity Dies)	(See STENTOR, Listed Above)			
Plastic Molding Dies (Machine Cut & Hubbed Cavity Dies)	SAMSON EXTRA Water, Oil Hardening	P5	C 0.10, Mn 0.40, Cr 2.30, Si 0.30	Water, Oil Movement ±B, ±A
Plastic Molding Dies (Machine Cut & Hubbed Cavity Dies)	(See SUPER SAMSON, Listed Above)			
Plastic Molding Dies (Hubbed Cavity Dies, Machine Cut Cavity Dies)	STAINLESS M.S. No. 2		C 0.30, Cr 13.00	Oil, Air Movement ±B, ±A*
Plastic Molding Dies (Machine Cut Cavity Dies, Hubs)	(See R.D.S., Listed Above)			
Plastic Molding Dies (Machine Cut Cavity Dies, Hubs, Ejector Pins)	(See VEGA MOLD STEEL, Listed Above)			
Punching and Shearing	(See HAMPDEN, H-9 DOUBLE HEADER, No. 11 SPECIAL, No. 484, No. 610, R.D.S., SOLAR, O-1, STENTOR, VEGA-FM, VEGA MOLD STEEL, Listed Above)			
Shock Resisting (Repeated, Intermittent Impact)	(See R.D.S., SOLAR, VEGA-FM, VEGA MOLD STEEL, Listed Above)			

*Plus or minus—depending on size and shape of section.

CHAMPION STEEL CO., 30520 Lakeland Blvd., Willowick, Ohio — Listing No. 19

Cold Work Dies (Blanking, Forming)	ECONO #1-V	W2	C 1.05, V 0.25	Water Mach. 100 Movement —C
Cold Work Dies (Heavy Blanking, Forming, Tube Rolls)	ECONO #2	L6	C 0.75, Cr 0.90, Ni 1.15, Mo 0.35	Oil Mach. 75 Movement +B
Cold Work Dies (Blanking, Forming)	CHOYCE 77	O1	C 0.90, Mn 1.00, Cr 0.50, W 0.50	Oil Mach. 90 Movement +B
Cold Work Dies (Blanking, Forming)	ECONO #5	A2	C 1.00, Cr 5.00, Mo 1.00	Air Mach. 90 Movement +A
Cold Work Dies (Blanking, Forming, Tube Rolls)	TRUDIE	D2	C 1.50, Cr 12.00, Mo 1.00, V 1.00	Air Mach. 60 Movement +A
Cold Work Dies (Blanking, Forming, Tube Rolls)	TRUDIE SPECIAL	D5	C 1.50, Cr 13.00, Mo 1.00, V 1.00, Co 3.00	Air Mach. 50 Movement +A
Hot Work Dies (Extruding, Diecasting)	CHAMPION HW 1	H12	C 0.35, Cr 5.00, Mo 1.50, W 1.50, V 0.40	Air Mach. 70 Movement +A
Hot Work Dies (Extruding, Diecasting)	CHAMPION HW 3	H13	C 0.35, Cr 5.00, Mo 1.50, V 1.00	Air Mach. 70 Movement +A
Hot Work Dies (Extruding, Diecasting)	CHAMPION HW 21	H21	C 0.35, Cr 3.50, W 9.00	Air Mach. 65 Movement +A
Plastic Mold Dies	GIANT SPECIAL	P20	C 0.35, Cr 0.90, Mo 0.30	Oil Mach. 90 Movement +B
Punching & Shearing (Cold Forming, Shock Resisting)	CHAMPION 255	S5	C 0.55, Si 1.85, Mn 0.80, Mo 0.40	Air Mach. 75 Movement +B
Shock Resisting (Punching, Cold Forming)	CHAMPION S-1	S1	C 0.50, Cr 1.50, W 2.50	Oil Mach. 75 Movement +A
Special Purpose (Brake Dies, Gears, Machine Parts)	B-50		C 0.50, Cr 1.10, Mo 0.25, V 0.15, Mn 0.85	Oil Mach. 110 Movement +B

CHROMALLOY CORP., SINTERCAST DIV., 169 Western Highway, West Nyack, N. Y. — Listing No. 20

Cold Work Dies (Punches, Dies, Gages, Wear Plates, Form Rolls, etc.)	FERRO-TIC C, Carbide Machinable, Heat Treatable		C 7.00, Cr 2.00, Mo 2.00, Ti 26.00, Fe bal
Cutting Tools (Form Cutters, Spiral End Mills, etc.)	FERRO-TIC J Machinable, Heat Treatable		Grade formulated for high temperatures encountered at cutting edges of lathe or rotary tools.

★ Last column indicates suggested Quenching Medium; Machinability Annealed, using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Hot Pressing Molds (Also Valve Parts, High Temperature Bearings, Seal Rings, Corrosion Resistant Slitters & Food Processing Knives)	FERRO-TIC S-45, Carbide Machinable		TiC 39.00, Cr 11.00, Ni 7.30, Fe 42.70	
Hot Pressing Molds (Also Valve Parts, High Temperature Bearings, Seal Rings, Corrosion Resistant Slitters & Food Processing Knives)	FERRO-TIC S-55, Carbide Machinable		TiC 52.00, Cr 8.60, Ni 5.70, Fe 33.70	

COLUMBIA TOOL STEEL CO., Lincoln Highway & State Street, Chicago Heights, Ill. — Listing No. 21

Brake Dies	CEC SMOOTHCUT	S4	C 0.58, Mn 0.85, Si 1.95, Cr 0.30, V 0.25	Water, Oil Movement + C
Brick Mold Liners	E-Z-DIE V	A7	C 2.25, Mn 0.70, Si 0.35, W 1.15, Mo 0.95, Cr 5.25, V 4.75	Air Movement + A
Cold Work Dies (Blanking, Cold Forming, Long Runs)	ATMODIE Air Hardening High Carbon, High Chrome	D2	C 1.55, Mn 0.35, Si 0.40, Mo 0.80, Cr 12.00, V 0.90	Air Movement + A
Cold Work Dies (Blanking, Cold Forming, Long Runs)	ATMODIE SMOOTHCUT Air Hardening High Carbon, High Chrome	D2	C 1.55, Mn 0.50, Si 0.40, Mo 0.80, Cr 12.00, V 0.90	Air Movement + A
Cold Work Dies (Blanking, Cold Forming)	EXL-DIE Oil Hardening, Nondeforming	O1	C 0.95, Mn 1.25, Si 0.35, W 0.50, Cr 0.50, V 0.10	Oil Movement + A
Cold Work Dies (Blanking, Cold Forming)	EXTRA Water Hardening	W1	C 1.05, Mn 0.25, Si 0.30	Water Movement —C
Cold Work Dies (Cold Forming)	EXTRA HEADERDIE Water Hardening	W1	C 0.95, Mn 0.35, Si 0.30	Water Movement —C
Cold Work Dies (Blanking, Cold Forming)	E-Z-DIE SMOOTHCUT Medium Chrome, Air Hardening	A2	C 1.00, Mn 0.80, Si 0.35, Mo 1.05, Cr 5.00, V 0.25	Air Movement + A
Cold Work Dies (Blanking, Cold Forming)	FIREDIE N SMOOTHCUT Air Hardening	A9	C 0.51, Mn 0.45, Si 1.10, Mo 1.35, Cr 5.00, V 1.05, Ni 1.50	Air Movement + A
Cold Work Dies (Blanking, Cold Forming)	OILDIE SMOOTHCUT Oil Hardening, Nondeforming		C 1.05, Mn 0.80, Si 0.45, W 0.50, Cr 1.60	Oil Movement + A
Cold Work Dies (Blanking, Cold Forming)	SPECIAL Water Hardening	W1	C 1.05, Mn 0.25, Si 0.30, Cr 0.16, V 0.05	Water Movement —C
Cold Work Dies (Blanking, Cold Forming)	STANDARD Water Hardening	W1	C 1.05, Mn 0.25, Si 0.20	Water Movement —C
Cold Work Dies (Blanking, Cold Forming, Long Runs)	SUPERDIE Oil Hardening, High Carbon, High Chrome	D3	C 2.10, Mn 0.35, Si 0.90, W 0.75, Cr 11.50	Oil Movement + A
Cold Work Dies (Blanking, Cold Forming)	VANADIUM STANDARD Water Hardening	W2	C 1.05, Mn 0.25, Si 0.20, V 0.20	Water Movement —C
Cold Work Dies (Blanking, Cold Forming)	WATERDIE EXTRA Water Hardening	W5	C 1.00, Mn 0.35, Si 0.30, Cr 0.50	Water Movement —C
Cold Work Dies (Blanking, Cold Forming)	(See CARVITE, CLARITE, COBITE, MOLITE, Listed Below)			
Cutting Tools (Roughing)	ACMITE Tungsten-Cobalt High Speed	T4	C 0.73, W 18.00, Cr 4.00, V 1.10, Co 5.00	Oil, Salt Movement + B
Cutting Tools (Finishing)	CARVITE Tungsten-Vanadium High Speed	T9	C 1.23, W 18.50, Cr 4.00, V 4.00	Oil, Salt Movement + B
Cutting Tools (Roughing, Finishing)	CLARITE Tungsten High Speed	T1	C 0.73, W 18.00, Cr 4.00, V 1.10	Oil, Salt Movement + B
Cutting Tools (Roughing)	COBITE Tungsten-Cobalt High Speed	T5	C 0.78, W 18.50, Cr 4.25, V 1.90, Co 8.75	Oil, Salt Movement + B
Cutting Tools (Roughing)	MAXITE Cobalt High Speed	T8	C 0.81, W 14.00, Cr 4.25, V 2.15, Co 5.25	Oil, Salt Movement + B
Cutting Tools (Roughing, Finishing)	MOLITE Molybdenum High Speed	M2	C 0.84, W 6.40, Mo 5.00, Cr 4.15, V 1.85	Oil, Salt Movement + B
Cutting Tools (Roughing, Finishing)	MOLITE SMOOTHCUT Molybdenum High Speed	M2	C 0.84, W 6.40, Mo 5.00, Cr 4.15, V 1.85	Oil, Salt Movement + B
Cutting Tools (Roughing, Finishing)	MOLITE 1 Molybdenum High Speed	M1	C 0.82, W 1.65, Mo 8.65, Cr 3.75, V 1.10	Oil, Salt Movement + B
Cutting Tools (Finishing)	MOLITE 3—TYPE 1 Molybdenum High Speed Type 1	M3	C 1.05, W 5.75, Mo 5.40, Cr 4.00, V 2.40	Oil, Salt Movement + B
Cutting Tools (Finishing)	MOLITE 3—TYPE 2 Molybdenum High Speed Type 2	M3	C 1.15, W 5.75, Mo 5.40, Cr 4.00, V 3.15	Oil, Salt Movement + B
Cutting Tools (Finishing)	VANITE Tungsten High Speed	T2	C 0.83, W 18.50, Cr 4.25, V 2.15	Oil, Salt Movement + B
Diecasting Dies	ALCODIE Air Hardening, Hot Work	H12	C 0.35, Mn 0.45, Si 0.90, W 1.25, Mo 1.45, Cr 5.00, V 0.40	Air Movement + A
Diecasting Dies	CASTDIE Air Hardening, Hot Work	H11	C 0.38, Mn 0.35, Si 0.90, Mo 1.35, Cr 5.00, V 0.50	Air Movement + A
Diecasting Dies	VANADIUM CASTDIE Air Hardening, Hot Work	H13	C 0.38, Mn 0.45, Si 1.00, Mo 1.35, Cr 5.00, V 1.05	Air Movement + A
Gages	(See ATMODIE, SUPERDIE, E-Z-DIE SMOOTHCUT, EXL-DIE, OILDIE SMOOTHCUT, EXTRA, Listed Above)			
Hot Work Dies (Hot Forming, Punching, Shearing)	BUSTER ALLOY Oil Hardening, Shock Resisting	S1	C 0.58, Mn 0.35, Si 0.95, W 2.25, Cr 1.25, V 0.25	Oil Movement + B
Hot Work Dies (Hot Forming, Punching, Shearing)	CLARITE HW50 Tungsten Hot Work	H26	C 0.53, Mn 0.30, Si 0.35, W 18.00, Cr 4.00, V 1.00	Oil, Salt Movement + B
Hot Work Dies (Hot Forming, Punching, Shearing)	FIREDIE Chromium Hot Work	H11	C 0.38, Mn 0.35, Si 0.90, Mo 1.35, Cr 5.00, V 0.50	Air Movement + A
Hot Work Dies (Hot Forming, Punching, Shearing)	FORMITE #2 Tungsten Hot Work	H21	C 0.33, Mn 0.30, Si 0.40, W 9.50, Cr 3.25, V 0.50	Oil Movement + B
Hot Work Dies (Hot Forming, Punching, Shearing)	FORMITE #3 Tungsten Hot Work	H24	C 0.51, Mn 0.35, Si 0.35, W 15.50, Cr 3.25, V 0.50	Oil Movement + B
Hot Work Dies (Hot Forming, Punching, Shearing)	MOLITE HW60 Molybdenum Hot Work	H43	C 0.63, Mn 0.30, Si 0.35, Mo 8.25, Cr 4.00, V 1.90	Oil, Air Movement + B
Hot Work Dies (Hot Forming, Punching, Shearing)	VANADIUM FIREDIE Chromium Hot Work	H13	C 0.38, Mn 0.45, Si 1.00, Mo 1.35, Cr 5.00, V 1.05	Air Movement + A

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Hot Work Dies (Hot Forming, Punching, Shearing)	(See also ALCODIE, FIREDIE N SMOOTHCUT, Listed Above)			
Plastic Mold Dies (Machine Cut Cavities)	(See BUSTER ALLOY, EXL-DIE, OILDIE SMOOTHCUT, Listed Above)			
Punching & Shearing	(See ATMODIE, BUSTER ALLOY, CLARITE, EXL-DIE, EXTRA, MOLITE, OILDIE SMOOTHCUT, SPECIAL, SUPERDIE, Listed Above)			
Shock Resisting (Repeated Impact)	SILICO-ALLOY Silico-Manganese Shock Resisting	S5	C 0.58, Mn 0.85, Si 1.95, Mo 0.45, Cr 0.30	Oil Movement + B Water Movement + C
Shock Resisting (Repeated Impact)	VANADIUM EXTRA Water Hardening	W2	C 1.05, Mn 0.25, Si 0.20, V 0.20	Water Movement —C
Shock Resisting	(See BUSTER ALLOY, CEC SMOOTHCUT, EXTRA, EXTRA HEADERDIE, SPECIAL, Listed Above)			

CRUCIBLE STEEL CO. OF AMERICA, P. O. Box 88, Pittsburgh 30, Pa. — Listing No. 22

Cold Work Dies (Blanking)	AIRDI 150 Air Hardening	D2	C 1.55, Mn 0.35, Si 0.45, Cr 11.50, V 0.90, Mo 0.80	Air Movement + A
Cold Work Dies (Blanking)	AIRDI 150-S Air Hardening		C 1.55, Cr 11.50, Mo 0.80, V 0.90, Mn 0.35, Si 0.45, S 0.15	Air Movement + A
Cold Work Dies (Blanking, Cold Forming)	AIRKOOL Air Hardening	A2	C 1.00, Mn 0.70, Si 0.30, Cr 5.25, V 0.30, Mo 1.15	Air Movement + A
Cold Work Dies (Blanking, Cold Forming)	ORBIT Air Hardening	A6	C 0.70, Mn 2.00, Si 0.30, S 0.15, Cr 1.00, Mo 1.35	Air Movement + A
Cold Work Dies (Blanking, Cold Forming)	AIRKOOL S Air Hardening		C 1.00, Mn 0.70, Cr 5.25, Mo 1.15, V 0.30, Si 0.30, S 0.15	Air Movement + A
Cold Work Dies (Blanking)	HYCC Air Hardening	D4	C 2.25, Mn 0.35, Si 0.50, Cr 11.50, V 0.20, Mo 0.80	Air, Oil Movement + A
Cold Work Dies (Blanking)	KETOS Oil Hardening	O1	C 0.90, Mn 1.35, Si 0.35, Cr 0.50, W 0.50	Oil Movement + A
Cold Work Dies (Cold Forming)	ALVA EXTRA Water Hardening	W2	C 0.95, Mn 0.25, Si 0.20, V 0.20	Water, Brine Movement —C
Cold Work Dies (Cold Forming)	ATHA PNEU Oil Hardening	S1	C 0.55, Mn 0.25, Si 0.25, Cr 1.25, V 0.20, W 2.75	Oil Movement + B
Cold Work Dies (Cold Forming)	CRESCENT SPECIAL Water Hardening	W1	C 1.05, Mn 0.35, Si 0.20	Water, Brine Movement —C
Cold Work Dies (Cold Forming)	GRANADA Water Hardening	W1	C 1.00, Mn 0.30, Si 0.25	Water Movement —C
Cold Work Dies (Cold Forming)	GRANADA VANADIUM Water Hardening	W2	C 1.00, Mn 0.30, Si 0.25, V 0.20	Water Movement —C
Cold Work Dies (Cold Forming)	LaBELLE EXTRA Water Hardening	W1	C 0.95, Mn 0.25, Si 0.20	Water, Brine Movement —C
Cold Work Dies (Cold Forming)	LaBELLE SILICON #2 Water Hardening	S5	C 0.60, Mn 0.85, Si 1.85, Cr 0.25, Mo 0.30	Water Movement + B
Cold Work Dies (Cold Forming)	LaBELLE COLD STRIKING DIE Water Hardening	W1	C 0.95, Mn 0.35, Si 0.45	Water, Brine Movement —C
Cold Work Dies (Cold Forming)	SANDERSON EXTRA Water Hardening		C 1.05, Mn 0.25, Si 0.20	Water, Brine Movement —C
Cold Work Dies (Cold Forming)	SANDERSON SPECIAL Water Hardening	W4	C 1.10, Mn 0.30, Si 0.50, Cr 0.25	Water Movement —C
Cold Work Dies, Wear Parts (Blanking, Cold Forming)	AIRKOOL V Air Hardening		C 2.25, Mn 0.35, Si 0.80, Cr 5.25, V 3.75, Mo 3.00	Air Movement + A
Cold Work Dies, Wear Parts (Blanking, Cold Forming)	HALCOMB 8S Oil Hardening	L7	C 1.05, Mn 0.35, Si 0.25, Cr 1.20, Mo 0.30	Oil Movement + B
Cutting Tools	REXALLOY Cast Alloy		C 2.25, Cr 33.00, W 17.00, Co 44.00	
Cutting Tools (Finishing)	CRUCIBLE DOUBLE SPECIAL Water Hardening	F3	C 1.30, W 3.50, Mn 0.30, Si 0.30	Water or Brine Movement —C
Cutting Tools (Finishing)	REX M-3 High Speed	M2	C 1.10, Mn 0.30, Si 0.30, Cr 4.00, V 3.00, W 6.00, Mo 5.00	Air, Oil, or Salt Movement + A
Cutting Tools (Finishing)	REX SUPERVAN High Speed	T2	C 0.85, Mn 0.30, Si 0.30, Cr 4.00, V 2.10, W 18.50, Mo 0.75	Air, Oil, or Salt Movement + A
Cutting Tools (Finishing)	REX 4V High Speed	T9	C 1.25, Mn 0.30, Si 0.30, Cr 4.00, V 4.00, W 18.50, Mo 0.75	Air, Oil, or Salt Movement + A
Cutting Tools (General Purpose)	REX AA High Speed	T1	C 0.75, Mn 0.30, Si 0.30, Cr 4.00, V 1.15, W 18.00	Air, Oil, or Salt Movement + A
Cutting Tools (General Purpose)	REX M-2 High Speed	M2	C 0.85, Mn 0.30, Si 0.30, Cr 4.15, V 1.95, W 6.40, Mo 5.00	Air, Oil, or Salt Movement + A
Cutting Tools (General Purpose)	REX M-2-S High Speed		C 0.85, Mn 0.30, S 0.15, Si 0.30, Cr 4.15, V 1.96, W 6.40, Mo 5.00	Air, Oil, or Salt Movement + A
Cutting Tools (General Purpose)	REX TMO High Speed	M1	C 0.85, Mn 0.30, Si 0.30, Cr 3.75, V 1.15, W 1.55, Mo 8.70	Air, Oil, or Salt Movement + A
Cutting Tools (General Purpose)	REX VM High Speed	M10	C 0.90, Mn 0.30, Si 0.30, Cr 4.00, V 1.95, Mo 8.00	Air, Oil, or Salt Movement + A
Cutting Tools (General Purpose)	REX 3V High Speed		C 1.00, Mn 0.30, Si 0.30, Cr 4.00, V 3.00, W 14.00, Mo 0.75	Air, Oil, or Salt Movement + A
Cutting Tools (Roughing)	REX AAA High Speed	T4	C 0.75, Mn 0.30, Si 0.30, Cr 4.00, V 1.15, W 18.00, Mo 0.75, Co 5.00	Air, Oil, or Salt Movement + A
Cutting Tools (Roughing)	REX SUPERCUT High Speed	T5	C 0.80, Mn 0.30, Si 0.30, Cr 4.00, V 2.00, W 18.50, Mo 0.65, Co 8.00	Air, Oil, or Salt Movement + A
Cutting Tools (Roughing)	REX M2-5 High Speed	M35	C 0.85, Cr 4.15, W 6.40, Mo 5.00, V 1.95, Co 5.00, Mn 0.30, Si 0.30	Air, Oil, or Salt Movement + A
Cutting Tools (Roughing)	REX 95 High Speed	T8	C 0.80, Mn 0.30, Si 0.30, Cr 4.00, V 2.00, W 14.00, Mo 0.75, Co 5.25	Air, Oil, or Salt Movement + A
Cutting Tools (Roughing)	REX 440 High Speed	T6	C 0.80, Mn 0.30, Si 0.30, Cr 4.00, V 2.00, W 19.50, Mo 0.60, Co 12.00	Air, Oil, or Salt Movement + A

★ Last column indicates suggested Quenching Medium; Machinability Annealed, using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Cutting Tools (Special Purpose)	REX 49 High Speed		C 1.10, Mn 0.45, Si 0.30, Cr 4.25, W 6.75, Mo 3.75, V 2.00, Co 5.00	Air, Oil, or Salt Movement +A
Diecasting (Aluminum Base)	NuDIE V Hot Work	H13	C 0.40, Mn 0.40, Si 1.10, Cr 5.00, V 1.10, Mo 1.35	Air Movement +A
Diecasting (Brass)	PEERLESS A Hot Work	H21	C 0.30, Mn 0.30, Si 0.30, Cr 3.35, V 0.25, W 9.00	Air, Oil Movement +A
Diecasting (Lead, Manganese, Tin or Zinc Base)	CSM #2 Oil Hardening	P20	C 0.30, Mn 0.80, Si 0.50, Cr 0.80, Mo 0.25	Oil Movement +B
Diecasting Dies (Parts)	(See REX AA, Listed Above)			
Diecasting Dies (Parts)	(See NuDIE V, Listed Above)			
Diecasting Dies (Parts)	(See REX M-2, Listed Above)			
Gages (Flat, Snap, Plug & Thread)	(See KETOS, AIRKOOL, HYCC, REX AA, REX M-2 & REXALLOY, Listed Above)			
Gages (Rings, Plugs)	HALGRAPH Graphitic Oil Hardening	O6	C 1.50, Mn 0.75, Si 1.00, Mo 0.25	Oil Movement +B
Gages (Snap)	CRESCENT SPECIAL Water Hardening	W1	C 1.05, Mn 0.35, Si 0.20	
High Stress Nonwear (Machinery Parts)	CRUCIBLE SELF-TEM Oil Hardening		C 0.35, Mn 0.70, Si 0.25, Cr 0.85, W 0.50, Mo 0.40	Oil Movement +B
Hot Work Dies (Forming, Punching & Shearing)	(See ATHA PNEU, Listed Above)			
Hot Work Dies (Forming, Punching & Shearing)	HALCOMB 218 Hot Work	H11	C 0.40, Mn 0.40, Si 1.05, Cr 5.00, V 0.35, Mo 1.35	Air Movement +A
Hot Work Dies (Forming, Punching & Shearing)	C.C.S. Hot Work	H14	C 0.40, Mn 0.30, Si 1.15, Cr 5.25, W 4.25	Air Movement +A
Hot Work Dies (Forming, Punching & Shearing)	CHRO-MOW Hot Work	H12	C 0.35, Mn 0.35, Si 1.05, Cr 5.00, V 0.25, W 1.25, Mo 1.35	Air Movement +A
Hot Work Dies (Forming, Punching & Shearing)	PEERLESS A Hot Work	H21	C 0.30, Mn 0.30, Si 0.30, Cr 3.35, V 0.25, W 9.00	Air or Oil Movement +A
Hot Work Dies (Forming, Punching & Shearing)	PEERLESS LCT #2 Hot Work	H22	C 0.40, Mn 0.30, Si 0.30, Cr 2.00, V 0.35, W 11.50	Air or Oil Movement +A
Hot Work Dies (Forming, Punching & Shearing)	PEERLESS 56 Hot Work	H10	C 0.40, Mn 0.55, Si 1.00, Cr 3.25, V 0.33, Mo 2.50	Oil Movement +B
Hot Work Dies (Forming, Punching & Shearing)	REX AA (OX TEMPER) Hot Work		C 0.65, Mn 0.30, Si 0.30, Cr 4.00, V 1.10, W 18.00	Air or Oil Movement +A
Hot Work Dies (Forming, Punching & Shearing)	REX AA (PX TEMPER) Hot Work	H26	C 0.55, Mn 0.30, Si 0.30, Cr 4.00, V 1.10, W 18.00	Air or Oil Movement +A
Plastic Molding Dies (Ejector Pins)	VICTOR DRILL ROD Water or Oil Hardening		C 1.00	Water or Oil Movement —C
Plastic Molding Dies (Ejector Pins)	(See NuDIE V, KETOS, Listed Above)			
Plastic Molding Dies (Hubbed Cavities)	FORMOLD Oil Hardening	P2	C 0.10 max, Mn 0.80, Si 0.15, Ni 0.55, Cr 2.00, Mo 0.20	Oil Movement +A
Plastic Molding Dies (Hubs)	(See AIRDI 150, AIRKOOL, ATHA PNEU, KETOS, LaBELLE SILICON #2, Listed Above)			
Plastic Molding Dies (Machine Cut Cavity)	CSM 2 Oil Hardening	P20	C 0.30, Mn 0.80, Cr 0.80, Mo 0.25, Si 0.50	Oil Movement +A
Plastic Molding Dies (Machine Cut Cavity)	(See AIRKOOL, KETOS, NuDIE V, Listed Above)			
Punching & Shearing	(See AIRDI 150, AIRKOOL, ALVA EXTRA, ATHA PNEU, HALVAN, KETOS, REX AA, REX M-2, LaBELLE SILICON #2, LaBELLE HT)			
Shock Resisting	LaBELLE HT Oil Hardening	S6	C 0.45, Mn 1.35, Si 2.30, Cr 1.40, V 0.30, Mo 0.40	Oil Movement +B
Shock Resisting (Intermittent Impact)	ALVA EXTRA	W2	C 0.95, Mn 0.25, Si 0.20, V 0.20	Water, Brine Movement —C
Shock Resisting (Intermittent Impact)	BLACK DIAMOND	W1	C 1.05, Mn 0.25, Si 0.25	Water, Brine Movement —C
Shock Resisting (Repeated Impact)	HALVAN Oil Hardening	L2	C 0.50, Mn 0.80, Si 0.30, Cr 1.00, V 0.20	Oil Movement +B
Shock Resisting (Repeated Impact)	(See ATHA PNEU, LaBELLE SILICON #2, LaBELLE HT, Listed Above)			

DARWIN & MILNER INC., 2222 Lakeside Ave., Cleveland 14, Ohio — Listing No. 23

Cold Forming	DARWIN BRAKE DIE Oil Hardening		C 0.50, Mn 1.00, Cr 0.85, Mo 0.15	Oil	Mach. 60
Cold Work Dies	CV Water Hardening	W2	C 0.95, V 0.20	Water	Mach. 100 Movement B
Cold Work Dies	DARGRAPH	O6	C 1.45, Mn 0.80, Si 1.15, Cr 0.20, Mo 0.25	Oil	Mach. 85 Movement A
Cold Work Dies	DARWIN #1 FM Air Hardening	D2	C 1.50, Mn 0.35, Cr 13.00, Mo 0.75, V 0.25, Si 0.40, Ni 0.40	Air	Mach. 50 Movement A
Cold Work Dies	DARWIN FLAME HRD Air Hardening		C 0.50, Mn 1.20, Cr 1.40, Mo 0.40, V 0.10, Si 0.50	Air	Mach. 75 Movement B
Cold Work Dies	H BRAND Oil Hardening	O2	C 0.90, Mn 1.50, Mo 0.30, Si 0.25	Oil	Mach. 90 Movement A
Cold Work Dies	MINEOR Air Hardening	A2	C 1.00, Mn 0.60, Cr 5.00, Mo 1.00, V 0.25, Si 0.40	Air	Mach. 65 Movement A
Cold Work Dies	OHT Oil Hardening	O1	C 0.90, Mn 1.20, Cr 0.50, W 0.50, Si 0.35	Oil	Mach. 85 Movement A
Cold Work Dies	TEMPER TOUGH Oil Hardening	L6	C 0.75, Mn 0.60, Cr 0.80, Mo 0.30, V 0.15, Si 1.15	Oil	Mach. 75 Movement B
Cold Work Dies (Blanking, Cold Forming)	NEOR Oil Hardening	D3	C 2.10, Mn 0.60, Cr 13.00, Si 0.40, Ni 0.50	Oil	Mach. 40 Movement A
Cold Work Dies (Blanking, Cold Forming)	PRK-33 Air Hardening	D5	C 1.40, Mn 0.30, Cr 13.00, Mo 0.60, Co 3.30, Si 0.60, Ni 0.50	Air	Mach. 50 Movement A
Cutting Tools	CANNON Oil, Air Hardening	T1	C 0.70, Mn 0.25, Cr 4.00, W 18.00, V 1.00, Si 0.35	Oil, Air	Mach. 50 Movement B

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Cutting Tools	CANNON SPECIAL Oil, Air Hardening	T2	C 0.80, Mn 0.25, Cr 4.00, W 18.00, Mo 0.60, V 2.00, Si 0.30	Oil, Air Mach. 50 Movement B
Cutting Tools	DARWIN 5V	T15	C 1.50, Mn 0.25, Si 0.25, W 12.50, Cr 5.00, V 5.00, Co 5.00	Oil Mach. 45 Movement B
Cutting Tools	DARWIN 505 Oil, Air Hardening	T4	C 0.70, Mn 0.30, Cr 4.00, W 18.00, Mo 0.60, V 1.15, Co 5.00, Si 0.25	Oil, Air Mach. 50 Movement B
Cutting Tools	DARWIN 505 SPECIAL Oil, Air Hardening	T5	C 0.80, Mn 0.30, Cr 4.00, W 18.00, Mo 0.80, V 2.00, Co 8.00, Si 0.25	Oil Mach. 45 Movement B
Cutting Tools	DARWIN 1366 Oil Hardening	T6	C 0.80, Mn 0.30, Cr 4.00, W 18.00, Mo 0.80, V 2.00, Co 13.00, Si 0.25	Oil Mach. 45 Movement B
Cutting Tools	DARWIN M-3 Oil Hardening	M3	C 1.10, Cr 4.00, W 5.75, Mo 5.00, V 2.50	Oil Mach. 55 Movement B
Cutting Tools	MT-6 Oil Hardening	M2	C 0.85, Mn 0.25, Cr 4.00, W 6.00, Mo 6.00, V 1.50, Si 0.25	Oil Mach. 55 Movement B
Fast Finishing	EE Water, Oil Hardening	W4	C 1.50, Mn 0.30, Cr 0.20, W 4.50, V 0.35, Si 0.30	Oil, Water Mach. 65 Movement B
Hot Work	DARWIN 93 Oil Hardening	H21	C 0.30, Cr 3.00, W 9.00, V 0.45	Oil Mach. 60 Movement A
Hot Work	FIREX SPECIAL Air Hardening	S10A	C 0.50, Mn 0.65, Cr 0.85, Mo 0.60, V 0.20, Si 0.30, Ni 4.00	Air Mach. 40 Movement A
Hot Work	IWI Oil Hardening	H24	C 0.45, Mn 0.25, Cr 4.00, W 15.00, V 0.70, Si 0.30	Oil Mach. 50 Movement B
Hot Work Dies	HWA Air Hardening	H13	C 0.35, Cr 5.00, Mo 1.00, V 1.00, Si 1.00	Air Mach. 70 Movement B
Hot Work Dies	HWS Oil, Air Hardening	H12	C 0.33, Cr 5.00, W 1.25, Mo 1.45, V 0.23, Si 0.85	Air, Oil Mach. 70 Movement B
Plastic Molding	HOBALITE Water Hardening		C 0.05, Mn 0.15, Si 0.01	Water Mach. 110 Movement B
Punches & Dies	SSC Water Hardening	W1	C 1.00, Mn 0.30, Si 0.50	Water Mach. 100 Movement C
Shock Resisting	XTRA TOUGH Water, Oil Hardening	S5	C 0.58, Mn 0.70, Mo 0.40, V 0.25, Si 1.85	Oil, Water Mach. 100 Movement B
Shock Resisting	W BRAND Oil Hardening	S3	C 0.45, Mn 0.35, Cr 0.80, W 0.85, Si 0.30	Oil Mach. 85 Movement B
Shock Steel	IDEOR Oil Hardening	S1	C 0.50, Mn 0.25, Cr 1.50, W 2.00, V 0.25, Si 0.30	Oil Mach. 85 Movement B

DELAWARE TOOL STEEL CORP., 34th & Market Street, Wilmington 99, Del. — Listing No. 24

Shock Resisting	DELAIR	A2	C, Mn, Si, Cr, Mo	Air Mach. 90 Movement A
Shock Resisting	DELAWARE EXTRA	W1	C, Mn, Si, V	Water Mach. 100 Movement C
Shock Resisting	DELAWARE H.S.	M2	C, Mn, Si, Cr, W, Mo, V	Air Mach. 60 Movement A
Shock Resisting	DELAWARE S.T.		C, Mn, Si, Mo, V	Water Mach. 100 Movement B
Shock Resisting	DELAWARE STANDARD	W1	C, Mn, Si	Water Mach. 100 Movement C
Shock Resisting	DELAWARE SUPERIOR		C, Mn, Si, Cr, W, Mo, V, Co	Air Mach. 60 Movement A
Shock Resisting	DELSTEEL ALLOY	S5	C, Mn, Si, Mo, V	Oil, Water Mach. 80 Movement B

DIAMONITE PRODUCTS MFG. CO., Shreve, Ohio — Listing No. 25

Ceramic Cutting Tools	DIAMONITE		Square, triangular & round throw-aways, both utility & precision.	

DIEHL STEEL CO., 1608 John St., Cincinnati 14, Ohio — Listing No. 26

Cold Work (Blanking-Forming Punches, etc.)	KROVAN Air Hardening	A2	C 1.00, Mn 0.70, Si 0.30, Cr 5.20, Mo 1.10, V 0.20	Air
Cold Work Dies (Blanking, Cold Forming)	GRADE "A" Water Hardening	W1, GR1	C 0.95, Mn 0.30, Si 0.20	Water Movement A
Cold Work Dies (Blanking, Cold Forming)	UTEX Oil Hardening	O1	C 0.95, Mn 1.00, Cr 0.50, W 0.60, V 0.25, Si 0.25	Oil
Cold Work Dies (Cold Forming)	HICRO Oil Hardening	D2, D3	C 1.55, Mn 0.25, Cr 12.00, Mo 0.80, V 0.35, Si 0.35	Oil, Air
Cold Work Dies (Punches, Small Tools)	VERI BEST DRILL ROD Oil Hardening	O1	C 0.95, Mn 1.05, Cr 0.55, W 0.65, V 0.15, Si 0.35	Oil
Cutting Tools	BLUE STREAK MOLY Oil Hardening, High Speed	M2	C 0.80, Cr 4.00, W 5.75, Mo 4.50, V 1.60	Oil
Cutting Tools	BLUE STREAK 18-4-1 Oil Hardening	T1	C 0.72, Cr 4.00, W 18.00, V 1.00	Oil
Hot Work Dies	A. M. D. Air Hardening		C 0.34, Mn 0.40, Cr 4.75, W 1.10, Mo 1.45	Air
Punching, Shearing	(See GRADE "A," UTEX, Listed Above)			
Ring Cold Work Dies	HOLLOBAR Oil Hardening	O1	C 1.05, Mn 0.38, Cr 1.46, Si 0.28	Oil

DoALL CO., 254 N. Laurel Ave., Des Plaines, Ill. — Listing No. 27

Cold Work Dies	OIL HARDENING	O1	C 0.90, Mn 1.20, Cr 0.50, W 0.50, Si 0.30, V 0.20	Oil Mach. 100 Movement A

★ Last column indicates suggested Quenching Medium; Machinability Annealed, using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Cold Work Dies (Lamination Dies, etc.)	AIR HARDENING	A2	C 1.00, Mn 0.50, Cr 5.00, Mo 1.25, V 0.30, Si 0.25	Air Mach. 85 Movement B
Cold Work Dies	LOW TEMPERATURE AIR HARDENING	A6	C 0.70, Mn 2.10, Si 0.30, Cr 1.00, Mo 1.30, S 0.12	Air Mach. 100 Movement A
Cutting Tools (Chip Removal, Cast Iron & Nonferrous, Roughing)	DO-1, Carbide			
Cutting Tools (Chip Removal, Cast Iron & Nonferrous, General Purpose)	DO-2, Carbide			
Cutting Tools (Chip Removal, Cast Iron & Nonferrous, Precision Boring, Light Finishing)	DO-3, Carbide			
Cutting Tools (Chip Removal, Cast Iron & Nonferrous, Work Hardening Alloys, Interrupted Cuts)	DO-30, Carbide			
Cutting Tools (Chip Removal, Steel, Roughing)	DO-15, Carbide			
Cutting Tools (Chip Removal, Steel, Interrupted Cuts, High Heat Resistant)	DO-16, Carbide			
Cutting Tools (Chip Removal, Steel, Finishing)	DO-17, Carbide			
Cutting Tools (Chip Removal, Steel, Precision Boring)	DO-18, Carbide			
Impact (Light)	DO-10, Carbide			
Impact (Medium)	DO-13, Carbide			
Impact (Heavy)	DO-14, Carbide			
Wear Surface (No Shock)	DO-2, Carbide			
Wear Surface (Light Shock)	DO-10, Carbide			
Wear Surface (Heavy Shock)	DO-11, Carbide			

FAGERSTA STEELS INC., 405 Lexington Ave., New York 17, N. Y. — Listing No. 28

Cold Work Dies	FB-W1 COLD HEADER DIE STEEL Water Hardening	W1	(Secure special information from manufacturer)	
Cold Work Dies	FB-A2 Air Hardening	A2	C 0.95-1.05, Mn 0.60-0.80, Cr 5.00-5.50, Mo 0.95-1.25, V 0.20-0.30, Si 0.20-0.40	Air
Cold Work Dies	FB-O1 OIL Oil Hardening	O1	C 0.85-0.95, Mn 1.00-1.20, Cr 0.40-0.60, W 0.40-0.60, Si 0.25-0.45	Oil
Cold Work Dies	FB-W1 SPECIAL Water Hardening	W1	C 1.00-1.20, Mn 0.25-0.35, Si 0.20-0.30	Water
Cold Work Dies	FB-W1 SS-EXTRA Water Hardening	W1	C 1.00-1.10, Mn 0.25-0.35, Si 0.25-0.35	Water
Cold Work Dies (Blanking)	FB-D2 Oil, Air Hardening	D2	C 1.55-1.70, Mn 0.25-0.35, Cr 11.50-12.50, Mo 0.70-0.90, V 0.15-0.25, Si 0.25-0.35	Air, Oil
Cold Work Tools	FB-W1 REGULAR Water Hardening	W1	C as specified, Mn 0.20-0.35, Si 0.25-0.35	Water
Cutting Tools (Roughing)	FB-T4 Oil, Air Hardening	T4	C 0.68-0.75, Mn 0.10-0.30, Cr 3.75-4.25, W 16.75-17.75, Mo 0.40-0.60, V 0.95-1.15, Co 4.25-4.75, Si 0.25-0.40	Oil, Air
Cutting Tools (Roughing)	FB-M2 Oil, Air Hardening	M2	C 0.75-0.85, Mn 0.20-0.30, Cr 3.90-4.30, W 5.50-6.00, Mo 4.50-5.50, V 1.40-1.75, Si 0.20-0.40	Oil, Air
Cutting Tools (Roughing)	FB-T1 Oil, Air Hardening	T1	C 0.70-0.75, Mn 0.10-0.30, Cr 3.75-4.25, W 17.50-18.50, V 0.95-1.15, Si 0.25-0.40	Oil, Air
Cutting Tools (Finishing)	(See FB-W1 SPECIAL, FB-W1 SS-EXTRA, Listed Above)			
Diecasting Dies	FB-H13	H13	C 0.40, Si 1.00, Cr 5.25, Mo 1.25, V 1.05	Air
Hot Work Dies	FB-H12 Air Hardening	H12	C 0.30-0.35, Mn 0.30-0.40, Cr 4.50-5.00, W 1.00-1.20, Mo 1.40-1.60, Si 0.80-1.00	Air
Hot Work Dies	(See FB-H12, Listed Above)			
Plastic Molding Dies	LUSTRE-DIE Pre-Hardened		C 0.50, Mn 1.00, Si 0.30, Cr 1.10, Mo 0.25	Oil
Plastic Molding Dies	REMA Water Hardening		C 0.05-0.07, Mn 0.15-0.20	
Plastic Molding Dies	REMA B		C 0.07, Mn 0.30, Si 0.15, Cr 1.00, Mo 0.25	Oil
Shock Resisting (Repeated Impact)	FB-S1 Water, Oil Hardening	S1	C 0.45-0.50, Mn 0.20-0.50, Cr 0.85-1.05, W 0.90-1.20, Mo 0.15-0.25, Si 0.15-0.30	Water, Oil

FAGERSTA STEELS PACIFIC INC., 1011 E. 61st St., Los Angeles 1, Calif. — Listing No. 29

Cold Work Dies	FB-W1 COLD HEADER Water Hardening	W1	(Secure special information from manufacturer)	
Cold Work Dies	FB-A2 CVM Air Hardening	A2	C 0.95-1.05 Mn 0.60-0.80, Cr 5.00-5.50, Mo 0.95-1.25, V 0.20-0.30, Si 0.20-0.40	Air
Cold Work Dies	FB-O1 OIL HARDENING Oil Hardening	O1	C 0.85-0.95, Mn 1.00-1.20, Cr 0.40-0.60, W. 0.40-0.60, Si 0.25-0.45	Oil
Cold Work Dies	FB-W1 EXTRA CARBON Water Hardening	W1	C 1.00-1.10, Mn 0.25-0.35, Si 0.25-0.35	Water
Cold Work Dies	FB-W1 SPECIAL CARBON Water Hardening	W1	C 1.00-1.20, Mn 0.25-0.35, Si 0.20-0.30	Water

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Cold Work Dies	FB-F2 FAST FINISHING Water Hardening	F2	C 1.25-1.35, Mn 0.20-0.40, W 3.00-4.00, Si 0.45	Water
Cold Work Dies (Stamping & Forming)	FB-L97		C 0.55, Cr 1.00, Ni 3.00, Mo 0.35	Air-Oil
Cold Work Dies (Blanking)	FB-D2 HIGH PRODUCTION Oil, Air Hardening	D2	C 1.55-1.70, Mn 0.25-0.35, Cr 11.50-12.50, Mo 0.70-0.90, V 0.15-0.25, Si 0.25-0.35	Air-Oil
Cold Work Dies (Blanking)	FB-D3 HIGH PRODUCTION "H"	D3	C 2.05, Mn 0.40, Cr 11.50, V 0.60	Air-Oil
Cold Work Tools	FB-W1 REGULAR CARBON Water Hardening	W1	C as specified, Mn 0.20-0.35, Si 0.25-0.35	Water
Cutting Tools (Roughing)	FB-T1 SILVER STRIPE HIGH SPEED Oil, Air Hardening	T1	C 0.70-0.75, Mn 0.10-0.30, Cr 3.75-4.25, W 17.50-18.50, V 0.95-1.15, Si 0.25-0.40	Oil, Air
Cutting Tools (Roughing)	FB-T4 SUPERKUT HIGH SPEED Oil, Air Hardening	T4	C 0.68-0.75, Mn 0.10-0.30, Cr 3.75-4.25, W 16.75-17.75, Mo 0.40-0.60, V 0.95-1.15, Co 4.25-4.75, Si 0.25-0.40	Oil, Air
Cutting Tools (Roughing)	FB-WM HIGH SPEED Oil, Air Hardening	M2		Oil, Air
Cutting Tools	FB-WKE-4 HIGH SPEED Air Hardening			
Cutting Tools (Finishing)	(See EXTRA, SPECIAL, etc., Listed Above)			
Hot Work Dies	FB-H12 HOT WORK Air Hardening	H12	C 0.30-0.35, Mn 0.30-0.40, Cr 4.50-5.00, W 1.00-1.20, Mo 1.40-160, Si 0.80-1.00	Air
Hot Work Dies	FB-H13 HOT WORK Air Hardening	H13	C 0.40, Si 1.00, Cr 5.25, Mo 1.25, V 1.05	Air
Hot Work Dies	FB-H21 HOT WORK Oil, Air Hardening	H21	C 0.28-0.33, Mn 0.20-0.30, Cr 3.00-3.50, W 9.50-10.50, V 0.25-0.50, Si 0.20-0.40	Oil, Air
Hot Work Dies	FB-H25 HOT WORK Oil, Air Hardening	H25	C 0.35-0.40, Mn 0.20-0.35, Cr 2.75-3.25, W 13.00-14.00, Si 0.20-0.40	Oil, Air
Hot Work Dies	FB-515 HOT WORK Air Hardening		C 0.35-0.40, Mn 0.20-0.35, Cr 4.80-5.30, W 4.80-5.30, Mo 0.15-0.30, Si 0.80-1.10	Air
Plastic Molding Dies	FB-REMA IRON		C 0.05-0.07, Mn 0.15-0.20	
Plastic Molding Dies	FB-REMA B		C 0.07, Mn 0.30, Si 0.15, Cr 1.00, Mo 0.25	Oil
Plastic Molding Dies	FB-BRILLIANT DIE	P20		Prehardened
Shock Resisting (Repeating Impact)	FB-S1 MIRYCAL Water, Oil Hardening	S1	C 0.45-0.50, Mn 0.20-0.50, Cr 0.85-1.05, W 0.90-1.20, Mo 0.15-0.25, Si 0.15-0.30	Water, Oil
Shock Resisting (Repeating Impact)	FB-S5 TUFKUT Water Hardening	S5	C 0.50-0.55, Mn 0.60-0.80, Mo 0.30-0.40, Si 1.30-1.60	Water

FAITOUTE IRON & STEEL CO. INC., 182 Frelinghuysen Ave., Newark 8, N. J. — Listing No. 30

Cold Work Dies	FISCO CARBON Water Hardening	W1	C. 1.05	Water Mach. 100 Movement +C
Cold Work Dies	FISCO CHROMDIE Air Hardening	D2	C 1.60, Cr 12.00, Mo 0.85, V 0.23	Air Mach. 45 Movement +A
Cold Work Dies	FISCO OILHARD Oil Hardening	O1	C 0.90, Mn 1.15, Cr 0.50, W 0.50, V 0.20	Oil Mach. 90 Movement +B
Cold Work Dies	FISCO SPECIAL Water Hardening	W1	C 1.05	Water Mach. 100 Movement +C
Cutting Tools	FISCO HIGH SPEED High Speed	T1	C 0.72, Cr 4.00, W 18.00, V 1.00	Oil, Air Mach. 60 Movement ±A
Cutting Tools	(See FISCO CARBON, FISCO SPECIAL, Listed Above)			
Shock Resisting (Intermittent Impact)	FISCO DUPLEX Water Hardening	W1	C 0.85	Water Mach. 100 Movement +C
Shock Resisting (Repeated Impact)	FISCO OMEGA Water, Oil Hardening	S5	C 0.60, Mn 0.80, Mo 0.50, V 0.25, Si 1.85	Oil, Water Mach. 65 Movement ±B

A. FINKL & SONS CO., 2011 Southport Ave., Chicago 14, Ill. — Listing No. 31

Hot Work Dies (Hot Forming)	CUPRODIE		Cr, Mo, Cu, Ni	Hardened
Hot Work Dies (Hot Forming)	DURODI Oil, Air Hardening		Cr, Mo, Si, Ni	Oil, Air Blast Movement A
Hot Work Dies (Hot Forming)	F Water Hardening		C, Mn	Water Movement B
Hot Work Dies (Hot Forming)	FS		Cr, Mo, Ni	Oil Movement —A
Hot Work Dies (Hot Forming)	FX		Cr, Mo, Ni	Hardened
Hot Work Dies (Hot Forming)	SHELLDIE Air Hardening		Cr, Mo, Si	Air Movement A
Hot Work Dies (Hot Forming)	SHELLEX		Cr, Mo, Si, V	Air Movement A
Hot Work Dies (Hot Forming)	W4X		Cr, Mo, Si, W	Air Movement A
Punching, Shearing (Cold, Hot Trimming)	COLD HOT Water, Oil Hardening		Cr, Mo	Oil, Water Movement A

★ Last column indicates suggested Quenching Medium; Machinability Annealed, using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.

FIRTH-LOACH METALS INC., Buttermilk Hollow Rd., P. O. Box 486, McKeesport, Pa. — Listing No. 32

Cutting Tools (Cast Iron, Nonferrous & Nonmetallics, Heavy Roughing or Interrupted Cutting) ..... FA-3, Carbide
Cutting Tools (Cast Iron, Nonferrous & Nonmetallics, Heavy Roughing or Light, Interrupted Cutting) ..... FA-4, Carbide
Cutting Tools (Cast Iron, Nonferrous & Nonmetallics, General Machining & Wear Resistant Applications) ..... FA-5, Carbide
Cutting Tools (Cast Iron, Nonferrous & Nonmetallics, General Purpose Machining) ..... FA-6, Carbide
Cutting Tools (Cast Iron, Nonferrous & Nonmetallics, Finishing) ..... FA-7, Carbide
Cutting Tools (Cast Iron, Nonferrous & Nonmetallics, Fine Finishing) ..... FA-8, Carbide
Cutting Tools (Steel & Steel Alloys, Heavy Roughing or Interrupted Cutting) ..... FT-3, Carbide
Cutting Tools (Steel & Steel Alloys, General Machine Shop Work) ..... FT-4, Carbide
Cutting Tools (Steel & Steel Alloys, Boring & Forming Locomotive Car Wheels) ..... FT-5, Carbide
Cutting Tools (Steel & Steel Alloys, Fine Finishing) ..... FT-6, Carbide
Cutting Tools (Steel & Steel Alloys, Precision Boring, Light Finishing) ..... FT-7, Carbide
Blanking Dies & Punches (Heavy Punches & Die Sections, Heavy Shock) ..... FB-3, Carbide
Blanking Dies & Punches (General Work) ..... FB-4, Carbide
Blanking Dies & Punches (Slitter Knives, Wear Parts, Punches for Thicker Metals) ..... FB-5, Carbide
Blanking Dies & Punches (Small Rolls, Wear Parts, Punches for Blanking Thin, Ductile Materials) ..... FB-6, Carbide
Draw Dies (For Drawing Wire, Tube & Bar Stock) ..... FD-3, Carbide
Draw Dies (For Drawing Wire, Tube & Bar Stock) ..... FD-4, Carbide
Draw Dies (For Drawing Wire, Tube & Bar Stock) ..... FD-5, Carbide
Heading Dies & Punches ..... FH-3, Carbide
Heading Dies & Punches ..... FH-4, Carbide
Heading Dies & Punches ..... FH-5, Carbide
Heading Dies & Punches ..... FH-6, Carbide
Mining Tools (Rock Bits) ..... FM-3, Carbide
Mining Tools (Coal Mining) ..... FM-4, Carbide
Mining Tools (Auger Bits) ..... FM-5, Carbide
Mining Tools (Auger Bits) ..... FM-6, Carbide

FIRTH STERLING INC., 3113 Forbes St., Pittsburgh 30, Pa. — Listing No. 33

Boring Tool (Hardest Material)	FIRTHITE HF, Carbide		WC 97, Co 3	
Boring Tool (High Speed)	FIRTHITE WF, Cermet		TiC 70, Mo_2C 18, Ni 12	
Cold Work Dies	AIRMO Air Hardening	A6	C 0.70, Cr 1.00, Mo 1.00, Mn 2.00	Air Mach. 80 Movement A
Cold Work Dies	CROMOVAN Air Hardening	D2	C 1.55, Cr 12.00, Mo 1.00, V 1.00	Air, Oil Mach. 45 Movement A
Cold Work Dies	C.H.Q. Water Hardening	W1	C 0.95	Brine, Water Mach. 100 Movement C
Cold Work Dies	INVARO #1 Oil Hardening	O1	C 0.90, Mn 1.15, Cr 0.50, W 0.50, V 0.20	Oil Mach. 90 Movement A
Cold Work Dies	TRIPLE DIE Oil Hardening	D3	C 2.20, Cr 12.00, V 0.25	Oil, Air Mach. 40 Movement A
Cold Work Dies, Tools	GLOBE DRILL ROD Water Hardening	W1	C 1.25	Brine, Water Mach. 100 Movement C
Cold Work Dies, Tools	SILVAN STAR Water Hardening	W2	C 1.00, V 0.20	Brine, Water Mach. 100 Movement C
Cold Work Dies, Tools	SPECIAL A.S.V. Water Hardening	W1	C 1.00	Brine, Water Mach. 100 Movement C
Cutting Tools (Light Interrupted Cuts, Slow Speeds, Cast Iron & Nonferrous Materials)	FIRTHITE H, Carbide		WC 94, Co 6	
Cutting Tools (General Purpose Work, Cast Iron & Nonferrous Materials)	FIRTHITE HA, Carbide		WC 90.5, Co 6.5, TiC 3	
Cutting Tools (Rough Intermittent Cuts, Coarse Feeds, Cast Iron & Nonferrous Materials)	FIRTHITE H, Carbide		WC 94, Co 6	
Cutting Tools (Strongest WC Grade, Skiving, Cast Iron & Nonferrous Materials)	FIRTHITE HC, Carbide		WC 87, Co 13	
Cutting Tools (Light Cuts, Fine Feeds, Cast Iron & Nonferrous Materials)	FIRTHITE HE, Carbide		WC 96, Co 4	
Cutting Tools (Rough Intermittent Cuts, Steel)	FIRTHITE T04, Carbide		WC 86, Co 10, TiC 4	
Cutting Tools (Heavy Duty, Steel)	FIRTHITE NTA, Carbide		WC 74.5, Co 9.5, TaC 10, TiC 6	
Cutting Tools (Light Steady Cuts, Fine Feeds, Steel)	FIRTHITE T16, Carbide		WC 76, Co 8, TiC 16	
Cutting Tools (Precision Boring, Steel)	(See FIRTHITE WF, Cermet, Listed Above)			
Cutting Tools (Hot Flash Trim, Welded Tubing)	FIRTHITE T66, Carbide		WC 60, Co 12, TaC 28	
Cutting Tools (High Speed Finishing)	(See FIRTHITE WF, Cermet, Listed Above)			
Cutting Tools	BLUE CHIP High Speed	T1	C 0.73, Cr 4.00, W 18.00, V 1.10	Oil, Air Mach. 55 Movement A
Cutting Tools	CIRCLE C High Speed	T5	C 0.77, Cr 4.50, W 18.50, Mo 1.00, V 2.00, Co 9.00	Oil, Air Mach. 40 Movement A
Cutting Tools	CIRCLE M High Speed	M36	C 0.85, W 6.00, Cr 4.00, Mo 5.00, Co 9.00, V 2.00	Oil, Air Mach. 45 Movement A
Cutting Tools	CIRCLE T-15 High Speed	T15	C 1.50, Cr 4.00, W 12.00, V 5.00, Co 5.00	Oil, Air Mach. 45 Movement A
Cutting Tools	RED CHIP High Speed	T4	C 0.75, Cr 4.00, W 18.00, Mo 0.75, V 1.10, Co 5.00	Oil, Air Mach. 50 Movement A
Cutting Tools	FS2-5 High Speed	T8	C 0.80, Cr 4.00, W 14.00, Mo 0.75, V 2.00, Co 5.00	Oil, Air Mach. 45 Movement A
Cutting Tools	FS M-2½ High Speed	M3	C 1.00, W 6.00, Cr 4.10, V 2.40, Mo 5.75	Air, Oil Mach. 50 Movement A
Cutting Tools	FS M-10 High Speed	M10	C 0.85, Cr 4.25, V 2.00, Mo 8.25	Oil, Air Mach. 60 Movement A
Cutting Tools	HI-MO High Speed	M1	C 0.80, Cr 4.00, W 1.60, Mo 8.70, V 1.25	Oil, Air Mach. 60 Movement A

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Cutting Tools	H.V. HI-MO High Speed	M7	C 1.00, Cr 4.00, Mo 8.75, W 1.75, V 2.00	Oil, Air Mach. 55 Movement A
Cutting Tools	MO CHIP High Speed	M20	C 0.59, Cr 5.00, Mo 8.00, V 1.25, Co 2.50, B 0.25	Oil, Air Mach. 55 Movement A
Cutting Tools	STAR-MO M2 High Speed	M2	C 0.83, Cr 4.00, W 6.40, Mo 5.00, V 2.00	Oil, Air Mach. 55 Movement A
Cutting Tools	SUPER HI-MO High Speed	M30	C 0.80, Cr 4.00, W 1.80, Mo 8.50, V 1.25, Co 5.00	Oil, Air Mach. 55 Movement A
Cutting Tools	SUPER MO CHIP High Speed	M40	C 0.59, Cr 4.20, W 1.65, Mo 8.15, V 1.80, Co 8.20, B 0.50	Oil, Air Mach. 40 Movement A
Cutting Tools	VAN CHIP	M3	C 1.15, Cr 4.10, W 6.00, Mo 5.75, V 3.00	Oil, Air Mach. 55 Movement A
General Purpose	(See FIRTHITE HA, Carbide, Listed Above)			
General Purpose	FIRTHITE TA, Carbide		WC 84, Co 6.5, Ti 9.5	
Hot Work Dies	H.W.D. #1 Air Hardening	H12	C 0.35, W 1.40, Cr 5.00, V 0.30, Mo 1.55, Si 1.00	Air, Oil Mach. 75 Movement A
Hot Work Dies	H.W.D. #2 Air Hardening	H11	C 0.37, Cr 5.25, V 0.50, Mo 1.35, Si 1.00	Air, Oil Mach. 75 Movement A
Hot Work Dies	H.W.D. #3 Air Hardening	H13	C 0.40, Cr 5.25, V 1.00, Mo 1.25, Si 1.00	Air, Oil Mach. 75 Movement A
Hot Work Dies	H.W.D. (Mod.)	H12 (Mod.)	C 0.55, W 1.40, Cr 5.00, V 0.30, Mo 1.55, Si 1.00	Air, Oil Mach. 75 Movement A
Hot Work Dies	L.T. FORGING DIE Oil, Air Hardening	H21	C 0.30, Cr 3.50, W 9.50, V 0.50	Air, Oil Mach. 60 Movement A
Hot Work Dies	XDH Oil, Air Hardening	H26	C 0.55, Cr 4.00, W 18.00, V 1.00	Oil, Air Mach. 60 Movement A
Hot Work Dies	XDL Oil, Air Hardening	H25	C 0.38, Cr 3.50, W 14.00, V 0.50	Oil, Air Mach. 60 Movement A
Punching & Shearing	CHIMO PUNCH Water, Oil Hardening	S5	C 0.55, Mn 0.95, Cr 0.15, Mo 0.50, V 0.20, Si 2.00	Water, Oil Mach. 85 Movement B
Punching & Shearing	J.S. PUNCH Oil Hardening	S1	C 0.50, Cr 1.40, W 2.50, V 0.25	Oil Mach. 80 Movement A
Shock Resisting	(See CHIMO PUNCH, J.S. PUNCH, Listed Above)			
Shock Resisting (Bolt Heading)	FIRTHITE ND25, Carbide		WC 70, Co 25, Ta 5	
Shock Resisting (Punches, Cold Heading).	(See FIRTHITE ND25, Carbide, Listed Above)			
Shock Resisting (Punches, Cold Heading, Extreme Service Requirements)	FIRTHITE ND30, Carbide		WC 70, Co 30	
Wear Parts (Guides, Gage Blocks)	FIRTHITE T41H, Carbide		WC 82, Co 8, Ta 10	
Wear Parts (Gage Components, Balls)	FIRTHITE CR-1, Chromium Carbide		Chromium Carbides 89, Ni 11	
Wear Parts (Valve Trim, Hot Extrusion).	FIRTHITE CR-2, Chromium Carbide		Chromium Carbides 84, Ni 16	
Wear Parts (Nozzles, Erosion Resistance).	FIRTHITE CR-3, Chromium Carbide		Chromium Carbides 70, Ni 15, TiC 15	

GENERAL ELECTRIC CO., METALLURGICAL PRODUCTS DEPT., 11147 E. Eight Mile Rd., Detroit 32, Mich.

Listing No. 34

Cutting Tools (Finishing, Cast Iron, Nonferrous) ..860, 895, 905, Carbide
Cutting Tools (Finishing & Light Roughing, Steel) ....78, 350, Carbide
Cutting Tools (General Purpose, Cast Iron, Nonferrous) .....860, 883, 895, Carbide
Cutting Tools (General Purpose Machining, Steel) .....78B, 370, Carbide
Cutting Tools (Heavy Duty Machining, Steel) .....370, Carbide
Cutting Tools (Heavy Duty Metal Cutting, Shock Resistant) 55A, Carbide
Cutting Tools (High Speed, Finishing, Ceramic) .....030, Oxide
Cutting Tools (Light Roughing, Finishing, Steel) .....78, 350, Carbide
Cutting Tools (Machining Alloy, Cast Iron & Aluminum) ..907, Carbide
Cutting Tools (Precision Finishing, Cast Iron, Nonferrous) ..999, Carbide
Cutting Tools (Precision Finishing, Steel) .....330, Carbide
Cutting Tools (Roughing Cuts, Cast Iron, Nonferrous) ....44A, Carbide
Cutting Tools (Woodworking—Large Tips, Intricate Forms) 44A, Carbide
Cutting Tools (Woodworking—Small Tips, Simple Form Tools) .....883, Carbide
Dies (Blanking & Light Heading) .....55B, Carbide
Dies (Deep Drawing) .....55A, Carbide
Dies (Fine Wire Drawing) .....44A, Carbide
Dies (Fine Wire Drawing, Small Sizes Steel Wire) .....999, Carbide
Dies (Heavy Duty Heading) .....190, Carbide
Dies (Hot Extrusion, Brass) .....608, Chrome Carbide
Dies (Wire Drawing) .....779, Carbide
Mechanical Applications (Heavy, Noncutting Metal for Rotors, Balance Weights) .....HEVIMET
Mechanical Applications (Radioactive Shielding) .....HEVIMET
Mechanical Applications (Extreme Wear Resistance) ..883, 895, Carbide
Mechanical Applications (High Strength, Wear & Shock Resistance) .....55A, Carbide
Mechanical Applications (Wear & Light Shock Resistance) ..44A, Carbide
Mechanical Applications (Wear with Corrosion & Heat Resistance) .....608, Chrome Carbide
Mining Tools (Coal) .....55A, Carbide
Mining Tools (Rotary & Percussion Type) ....90, 100, 101, 111, Carbide

GULTON INDUSTRIES INC., INTERNATIONAL DIV., 212 Durham Ave., Metuchen, N. J.

Listing No. 35

Ceramic Cutting Tools	CEROC		Available in squares, triangles & round inserts.	

HAWKRIDGE BROS. CO., 303 Congress St., Boston 10, Mass.

Listing No. 36

Cold Work Dies (Blanking)	KETOS Oil Hardening	O1	C 0.90, Mn 1.25, Cr 0.50, W 0.50	Oil
Cold Work Dies (Blanking) (Ground Stock)	(See KETOS, Listed Above)			
Cold Work Dies (Cold Forming)	HAWK BRAND Water Hardening	W1	C 1.00/1.10	Water, Brine
Cold Work Dies (Cold Forming)	HAWK COLD HEADING DIE Water Hardening	W1	C 0.85/0.95	Water, Brine

★ Last column indicates suggested Quenching Medium; Machinability Annealed, using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Cold Work Dies (Cold Forming)	HAWK SPECIAL Water Hardening	W1	C 1.20/1.30	Water, Brine
Cold Work Dies (Cold Forming)	HAWK VANADIUM Water Hardening	W2	C 0.95/1.05, V 0.15/0.30	Water, Brine
Shock Resisting (Intermittent Impact)	HAWK STANDARD Water Hardening	W1	C 0.90/1.00	Water, Brine
Special Roll Steel (Metal Working Rolls)	HAWK H ROLL STEEL Water Hardening	L7	C 0.85/1.10, Mn 0.30/0.60, Si 0.15/0.30, Cr 1.00/1.50, V 0.15/0.30	Water, Oil

HAYNES STELLITE CO., division of Union Carbide Corp., 1020 W. Park Ave., Kokomo, Ind.

Listing No. 37

Cutting Tools (Roughing, Finishing) (Moderate Impact, High Speed, Feed, Heavy Cut)	HAYNES STELLITE STAR-J METAL ALLOY (Cast Alloy)	Cr 32, W 17, Co 41, C 2.50, Fe 3, Ni 2.5	
Cutting Tools (Roughing, Finishing) (Moderate Impact, High Speed & Feed)	HAYNES STELLITE ALLOY NO. 3 (Cast Alloy)	Cr 30, W 12, Co 47, C 2.50	
Cutting Tools (Roughing, Finishing) (Withstands Severe Shock)	HAYNES STELLITE ALLOY NO. 19 (Cast Alloy)	Cr 31, W 10, Co 53, C 1.50	
Cutting Tools (Roughing, Finishing) (Moderate Impact, High Speed)	HAYNES STELLITE 98 M2 ALLOY (Cast Alloy)	Cr 30, W 18, Co 38, C 2.00, Fe 2.2, Ni 3.5	
Diecasting Dies	(See HAYNES STELLITE NO. 3, Listed Above)		
Diecasting Dies	HAYNES STELLITE ALLOY NO. 6* (Cast Alloy)	Cr 27, W 4, Co 60, C 1.15	
High Stress & High Wear Machinery Parts	(See HAYNES STELLITE ALLOYS NO. 3, 6, 19, 98M2, STAR J METAL)		
High Stress & High Wear Machinery Parts	HAYNES STELLITE ALLOY NO. 4	Cr 30, W 14, Fe 3, Co 51, C 0.6	
High Stress & High Wear Machinery Parts	HAYNES STELLITE ALLOY NO. 6B	Cr 30, W 4.5, Co 59, C 1.10	
High Stress & High Wear Machinery Parts	HAYNES STELLITE ALLOY NO. 6K	Cr 31, W 4.5, Co 58, C 1.60	
High Stress & High Wear Machinery Parts	HAYNES STELLITE ALLOY NO. 12*	Cr 31, W 8, Fe 2, Co 55, C 1.35	
High Stress & High Wear Machinery Parts	HAYNES ALLOY NO. 90	Cr 27, Fe 68, C 2.75	
High Stress & High Wear Machinery Parts	HAYNES ALLOY NO. 93	Cr 17, Fe 53, C 3.0, Mo 16 Co 6	
Hot Punching, Hot Shearing (Hard Facing Material)	HASTELLOY ALLOY C* Nickel Base Alloy	Cr 16, W 4, Mo 17, Fe 6, C 0.15 max, Ni Bal	
Hot Punching, Hot Shearing (Hard Facing Material)	(See STELLITE ALLOY NO. 6, Listed Above)		
Shock Resisting (Hard Facing Material)	(See HAYNES STELLITE ALLOY NO. 12, Listed Above)		
Shock Resisting	HAYNES ALLOY NO. 25	Cr 20, W 15, Fe 3, Ni 10, Co 49, C 0.09	
Shock Resisting	(See HAYNES STELLITE ALLOYS NO. 6, 6B, 6K, 19, Listed Above)		
Shock Resisting (Hard Facing Material)	HASCROME	Cr 12, Mn 4, C 1.0, Fe Bal	
Shock Resisting (Hard Facing Material)	(See HAYNES STELLITE ALLOY NO. 12, Listed Above)		

*These alloys are available in castings for the services specified. Hastelloy Alloy C & Haynes Stellite Alloy No. 6 are also recommended for shock resisting service.

HEPPENSTALL CO., 4620 Hatfield St., Pittsburgh 1, Pa.

Listing No. 38

Cold Shearing	R43 Oil, Air Hardening	D2	C 1.55, Mn 0.25, Cr 11.50, W 0.55, Mo 0.55, Si 0.35	Air, Oil Mach. 50 Movement +A
Cold Shearing	R45 Oil, Air Hardening	D1	C 0.85, Mn 0.25, Cr 11.50, Mo 0.45, Si 0.35	Air, Oil Mach. 50 Movement +A
Cold Shearing	R97 Oil Hardening	S5	C 0.58, Mn 1.00, Cr 0.30, Mo 0.38, Si 2.15	Oil Mach. 80 Movement —C
Cold Shearing	H44 Air Hardening	A2	C 1.00, Mn 0.60, Cr 5.10, Mo 1.00, V 0.25, Si 0.30	Air Mach. 65 Movement A
Cold Shearing	CARTOS, 2V72 Water Hardening	W2	C 0.80, Mn 0.40, V 0.05, Si 0.60	Water Mach. 100 Movement —C
Cold Shearing	CARTOS, 2V90 Water Hardening	W2	C 0.90, Mn 0.40, V 0.05, Si 0.60	Water Mach. 100 Movement —C
Cold Shearing	T71 Oil Hardening	MOD. S1	C 0.50, Mn 0.30, Cr 1.25, W 2.35, Si 0.95	Oil Mach. 75 Movement B
Cold Work Dies	(See R43, Listed Above)			
Cold Work Dies	(See R45, Listed Above)			
Cold Work Dies	(See H44, Listed Above)			
Cold Work Dies	(See CARTOS, 2V72, Listed Above)			
Cold Work Dies	(See CARTOS, 2V90, Listed Above)			
Cold Work Dies	T716 Water, Oil Hardening	S3	C 0.48, Mn 0.50, Cr 0.80, W 1.10, Si 0.30	Water, Oil Mach. 75 Movement (Water —C, Oil B)
Cold Work Dies	T719 Air, Oil Hardening		C 0.65, Mn 0.30, Cr 4.25, W 1.10, Mo 1.50, Si 1.00	Air, Oil Mach. 75 Movement +A
Cold Work Dies	B76 Oil Hardening	O1	C 0.97, Mn 1.15, Cr 0.50, W 0.50, V 0.20, Si 0.40	Oil Mach. 90 Movement +A
Cold Work Dies	9C68 Oil Hardening	L6	C 0.68, Mn 0.65, Cr 0.65, Ni 1.25, Mo 0.45, Si 0.30	Oil Mach. 75 Movement +A
Cold Work Dies	A110 Water Hardening	W1	C 1.10, Mn 0.30, Si 0.30	Water Mach. 95 Movement —C

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Diecasting Dies (Aluminum, Zinc)	THERMOTEM 10 Air Hardening		C 0.33, Mn 0.30, Cr 4.75, Mo 1.80, Si 1.00	Air Mach. 75 Movement A
Diecasting Dies (Aluminum, Zinc)	THERMOTEM 11	H11	C 0.40, Mn 0.30, Cr 5.25, Mo 1.10, Si 1.00, V 0.50	Air Mach. 75 Movement A
Diecasting Dies (Aluminum, Brass)	THERMOTEM 12 Air Hardening	H12	C 0.35, Mn 0.35, Cr 5.00, Mo 1.45, Si 1.00, V 0.35, W 1.25	Air Mach. 75 Movement A
Diecasting Dies (Aluminum, Brass)	THERMOTEM 13 Air Hardening	H13	C 0.40, Mn 0.30, Cr 5.25, Mo 1.15, Si 1.00, V 0.95	Air Mach. 75 Movement A
Diecasting Dies (Aluminum, Brass)	T717 Air Hardening		C 0.33, Mn 0.30, Cr 4.75, Mo 1.30, Si 1.00, W 1.10	Air Mach. 75 Movement A
Diecasting Dies (Lead, Zinc)	MOLDTEM Oil Hardening		C 0.40, Mn 0.85, Cr 0.95, Mo 0.20, Si 0.30	Oil Mach. 75 Movement B
Holder Dies	HOLDERTEM (Prehardened)		C 0.40, Mn 0.85, Cr 0.95, Mo 0.20	
Hot & Cold Trimming	TRIMMAX Oil, Air Hardening		C 0.95, Mn 0.30, Cr 3.75, Mo 0.20, Si 0.25, V 0.17	Oil, Air Mach. 75 Movement + A
Hot & Cold Trimming	T51 Oil Hardening		C 0.63, Mn 0.60, Cr 0.70, Ni 1.35, W 2.15, Si 0.30	Oil Mach. 75 Movement B
Hot Shearing	(See THERMOTEM 10, Listed Above)			
Hot Shearing	(See THERMOTEM 12, Listed Above)			
Hot Shearing	T73 Oil, Air Hardening	H21	C 0.27, Mn 0.30, Cr 3.45, W 8.75, V 0.20, Si 0.45	Oil, Air Mach. 70 Movement B
Hot Shearing	T77 Oil, Air Hardening		C 0.32, Mn 0.30, Cr 4.00, W 11.50, V 0.20, Si 0.30	Oil, Air Mach. 70 Movement B
Hot Work Dies	HARDTEM Prehardened		C 0.55, Mn 0.75, Cr 1.00, Mo 0.43, V 0.05, Si 0.30	Oil Mach. 75 Movement B
Hot Work Dies	"C" ANNEALED Annealed		C 0.55, Mn 0.85, Cr 1.05, Mo 0.47, V 0.12, Si 0.30	Oil Mach. 75 Movement B
Hot Work Dies	PYROTEM Prehardened		C 0.55, Mn 0.60, Cr 0.87, Mo 0.73, Ni 2.10, S 0.60	Oil, Air Mach. 75 Movement B
Hot Work Dies	SUPER PYROTEM Prehardened		C 0.45, Mn 0.45, Cr 1.45, Mo 0.75, Ni 4.30, V 0.14, Si 0.60	Oil, Air Mach. 50 Movement + A
Hot Work Dies	PRESTEM Prehardened		C 0.20, Mn 0.70, Ni 3.12, Mo 3.37, Si 0.30, Cr 0.15 max (Special Precipitation Hardening Steel)	Air Mach. 75 Movement + A
Hot Work Dies	(See THERMOTEM 10, Listed Above)			
Hot Work Dies	(See THERMOTEM 11, Listed Above)			
Hot Work Dies	(See THERMOTEM 12, Listed Above)			
Hot Work Dies	(See THERMOTEM 13, Listed Above)			
Hot Work Dies	SUPER HARDTEM Prehardened		C 0.42, Mn 0.70, Ni 2.60, Cr 1.35, Mo 0.55, V 0.18, Si 0.43	Oil Mach. 75 Movement B
Hot Work Dies	(See T71, Listed Above)			
Hot Work Dies	T72 Oil Hardening	S1	C 0.47, Mn 0.30, Cr 1.35, W 1.95, V 0.23, Si 0.30	Oil Mach. 75 Movement + B
Hot Work Dies	T74 Oil Hardening		C 0.50, Mn 0.30, Cr 1.40, W 2.35, V 0.20, Si 0.50	Oil Mach. 75 Movement + B
Hot Work Dies	(See T73, Listed Above)			
Hot Work Dies	(See T77, Listed Above)			
Hot Work Dies	(See T717, Listed Above)			
Hot Work Dies	T79 Air, Oil Hardening		C 0.43, Mn 0.30, Si 0.60, Cr 5.25, W 4.00, V 0.22	Air, Oil Mach. 65 Movement + A
Plastic Mold Dies	MOLDTEM Prehardened		C 0.40, Mn 0.85, Cr 0.95, Mo 0.20	

HIDALGO STEEL CO. INC., 74 Varick St., New York, N. Y. — Listing No. 39

Chisels, Punches, Shear Blades	UNICO Water Hardening		Tungsten chromium steel	Water Movement —C Oil Movement —B
Dies	CHROME B Oil Hardening		High chromium	Oil Movement —A
Hand Bull Points, Chisels, Fire Tools	MILO Water Hardening		C 0.43-0.48, Mn 1.00-1.10	Water Movement —C Oil Movement —B
High Speed	COBALT			Oil Movement —B
High Speed	JANO		Cr 3.00, C 0.80, W 18, V 2.00, Mo 0.75	Oil Movement —B
Pneumatic Chisels, Punches	FUEGO		C 0.55, Mn 0.85, Cr 0.25, V 0.30, Si 2.00	Water Movement —C
Punches, Chisels, Shear Blades	COLOSSO No Draw Steel		C 0.35, Mn 0.70, Cr 0.80, Mo 0.30, Si 0.45	Water Movement —B
Shear Blades, Chisels	HIDALGO		Cr 1.00, W 1.50-2.00	Water Movement —C Oil Movement —B

HOUGHTON & RICHARDS INC., 19 Jersey St., Boston 15, Mass. — Listing No. 40

Brake Dies	H & R BRAKE DIE		C 0.50, Mn 1.00, Cr 0.95, Mo 0.20	
Carbide Shank Steel	H & R No. 8 Water, Oil Hardening	S5	C 0.60, Mn 0.70, Mo 0.45, V 0.20, Si 1.85	Water, Oil Mach. 65 Movement + B
Carbide Shank Steel	H & R N175 Oil Hardening	L6	C 0.75, Mn 0.75, Cr 0.90, Mo 0.42, Si 0.30, Ni 1.75	Oil Mach. 75 Movement + A
Cold Heading	H & R HEADING DIE Water Hardening	W1	C 0.90-1.00, Mn 0.20, Si 0.30	Brine Mach. 100 Movement + C
Cold Work Dies (Blanking, Cold Forming)	H & R GOLD LABEL Water Hardening	F3	C 1.40, Mn 0.25, W 4.00, Cr 0.50, Si 0.20, V 0.30	Water Mach. 65 Movement —B

★ Last column indicates suggested Quenching Medium; Machinability Annealed, using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Cold Work Dies (Blanking, Cold Forming)	H & R K Oil Hardening	D3	C 2.32, Mn 0.32, Cr 13.00, V 0.22, Si 0.22	Oil Mach. 40 Movement +A
Cold Work Dies (Blanking, Cold Forming)	H & R K-2 Oil, Air Hardening	D2	C 1.50, Mn 0.25, Cr 11.50, Mo. 0.75, V 0.25, Si 0.30	Oil, Air Mach. 45 Movement +A
Cold Work Dies (Blanking, Cold Forming)	H & R K-2L Air, Oil Hardening	D1	C 0.85, Ni 1.00, Mo 0.45, Cr 11.50, V 0.30	Oil, Air Mach. 50 Movement +A
Cold Work Dies (Blanking, Cold Forming)	H & R K-3 Air Hardening	D7A	C 2.40, Si 0.25, Mn 0.25, Cr 13.00, V 4.00, Mo 1.00	Air Mach. 40 Movement +A
Cold Work Dies (Blanking, Cold Forming)	H & R No. 50 Oil Hardening	H26	C 0.53, Mn 0.25, Cr 4.10, W 18.00, V 1.13, Si 0.25	Oil Mach. 55 Movement +A
Cold Work Dies (Blanking, Cold Forming)	H & R OIL HARDENING Oil Hardening	O2	C 0.95, Mn 0.95, Cr 0.55, Si 0.20	Oil Mach. 90 Movement +B
Cold Work Dies (Blanking, Cold Forming)	H & R TUNGSTEN OIL HARDENING Oil Hardening	O1	C 0.90, Mn 1.10, Cr 0.50, W 0.50, V 0.20, Si 0.25	Oil Mach. 90 Movement +B
Cold Work Dies (Blanking, Cold Forming)	H & R No. 60 Water, Oil Hardening	O7	C 1.20, Mn 0.25, Cr 0.70, W 1.60, Mo 0.25, V 0.20, Si 0.30	Water, Oil Mach. 85 Movement +A
Cold Work Dies (Blanking, Cold Forming)	H & R No. 61 Air Hardening	D5	C 1.35, Mn 0.25, Cr 12.12, Mo 0.64, Co 3.04, Si 0.50	Air Mach. 60 Movement +A
Cold Work Dies (Blanking, Cold Forming)	H & R No. 80 Air Hardening	A2	C 1.00, Mn 0.65, Cr 5.25, Mo 1.10, V 0.25, Si 0.20	Air Mach. 85 Movement +A
Cutting Tools (Roughing)	H & R SUPER COBALT High Speed	T6	C 0.80, Mn 0.20, Cr 4.25, W 20.50, Mo 0.60, V 1.35, Co 12.25, Si 0.32	Oil, Air, Salt Bath Mach. Movement +A 40
Cutting Tools (Roughing)	H & R No. 4 High Speed	T5	C 0.80, Cr 4.50, W 18.50, Mo 0.80, V 1.75, Co 7.50	Oil, Air, Salt Bath Mach. Movement +A 45
Cutting Tools (Roughing, Finishing)	H & R COBALT High Speed	T4	C 0.78, Cr 4.00, W 18.00, V 1.00, Co 5.00	Oil, Air, Salt Bath Mach. Movement +A 50
Cutting Tools (Roughing, Finishing)	H & R COBALT MOLY High Speed	M36	C 0.88, Mn 0.25, Cr 4.10, W 6.00, Mo 6.00, V 1.90, Co 9.00, Si 0.25	Oil Mach. 45 Movement +A
Cutting Tools (Roughing, Finishing)	H & R MOLYHI High Speed	M1	C per temper, Cr 4.00, W 1.50, Mo 8.50, V 1.15	Oil, Air, Salt Bath Mach. Movement +A 55
Cutting Tools (Roughing, Finishing)	H & R MOLY VAN High Speed	M10	C 0.82, Cr 4.00, Mo 9.00, V 2.20	Oil, Air, Salt Bath Mach. Movement +A 60
Cutting Tools (Roughing, Finishing)	H & R SUPER MOLYHI High Speed	M30	C 0.82, Mn 0.25, Cr 4.00, W 1.50, Mo 8.50, V 1.25, Co 5.00, Si 0.32	Oil, Air, Salt Bath Mach. Movement +B 50
Cutting Tools (Roughing, Finishing)	H & R No. 1 High Speed	T1	C 0.70, Mn 0.20, Cr 4.00, W 18.00, V 1.00, Si 0.30	Oil, Air, Salt Bath Mach. Movement +A 55
Cutting Tools (Roughing, Finishing)	H & R No. 2 High Speed	T2	C 0.80, Cr 4.25, W 18.50, Mo 0.65, V 2.15, Si 0.35	Oil, Air, Salt Bath Mach. Movement +A 45
Cutting Tools (Roughing, Finishing)	H & R No. 3 High Speed	T3	C 1.04, Mn 0.26, Cr 4.18, W 18.46, Mo 0.84, V 3.41, Si 0.27	Oil, Air, Salt Bath Mach. Movement +A 50
Cutting Tools (Roughing, Finishing)	H & R No. 7 High Speed	M3	C 1.15, Mn 0.25, Cr 4.00, W 6.00, Mo 6.00, V 3.00, Si 0.25	Oil Mach. 50 Movement +A
Cutting Tools (Roughing, Finishing)	H & R No. 7 TYPE 1	M3	C 1.02, WC 0.10, Cr 4.00, V 2.40, Mo 6.00	Oil Mach. 70 Movement +A
Cutting Tools (Roughing, Finishing)	H & R No. 57 High Speed	M2	C 0.80, Mn 0.25, Cr 4.00, W 6.00, Mo 5.00, V 1.90, Si 0.25	Oil, Air, Salt Bath Mach. Movement +A 55
Cutting Tools (Roughing, Finishing)	H & R No. 445 High Speed	T15	C 1.50, W 13.50, Cr 4.50, V 4.75, Co 5.00, Mo 0.50	Oil Mach. 40 Movement +A
Cutting Tools (Also Hot & Cold Work Dies)	H & R No. 45 High Speed	H42	C 0.65, W 6.50, Cr 4.00, V 2.00, Mo 5.00	Oil Mach. 60 Movement +A
Diecasting Dies	H & R HOT WORK No. 5 (Hot Work Type)	H13	C 0.35, Mn 0.35, Cr 5.00, Mo 1.00, Si 1.00, V 1.00	Air Mach. 65 Movement +A
Diecasting Dies	H & R HOT WORK No. 6 (Hot Work Type)	H12	C 0.35, Mn 0.35, Cr 5.00, W 1.35, Mo 1.75, Si 1.00	Air Mach. 75 Movement +A
Diecasting Dies	H & R HOT WORK No. 7 (Hot Work Type)	H12	C 0.55, Mn 0.30, Cr 5.00, W 1.20, Mo 1.20, Si 0.95	Air, Oil Mach. 85 Movement +A
Diecasting Dies	H & R No. 55 High Speed	H14	C 0.35, Mn 0.25, Cr 5.25, W 5.25, Mo 0.20, V 0.20, Co 0.50, Si 0.90	Air Mach. 65 Movement +A
Heading Dies	H & R SPECIAL HEADING DIE Water Hardening	W1	C 0.90-1.00, Mn 0.20, Si 0.30	Brine Mach. 100 Movement +C
Hot Work Dies (Hot Forming)	H & R No. 550 (Hot Work Type)	H41	C 0.30, Si 0.40, W 1.00, Mo 6.25, Cr 3.75, V 0.75	Oil Mach. 75 Movement +B
Hot Work Dies (Hot Forming)	H & R HOT WORK No. 12 (Hot Work Type)	H23	C 0.30, Mn 0.35, Cr 12.00, W 12.00, V 0.90, Si 0.50	Air, Oil Mach. 50 Movement +A
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	H & R HOT WORK No. 2 (Hot Work Type)	H21	C 0.33, Mn 0.20, Cr 3.50, W 9.25, V 0.50, Si 0.30	Oil, Water Mach. 60 Movement +A
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	H & R HOT WORK No. 15 (Hot Work Type)	H25	C 0.25, Mn 0.29, Cr 4.03, W 15.10, V 0.51, Si 0.26	Oil Mach. 65 Movement +A
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	MYA Oil Hardening	H8A	C 0.42, Mn 0.30, Cr 1.45, V 0.25, Si 1.45	Oil Mach. 55 Movement +B
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	H & R No. 225 Oil, Air Hardening	S1	C 0.50, Mn 0.25, Cr 1.50, W 2.50, V 0.25, Mo 0.50 max	Oil, Air Mach. 80 Movement +A
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	(See H & R HOT WORK No. 5, H & R HOT WORK No. 6, H & R No. 55, Listed Above)			
Pistons	H & R PISTON Water Hardening	W5	C 1.14, Mn 0.32, Cr 0.58, V 0.19, Si 0.21	Water Mach. 80 Movement +C
Plastic Molding Dies (All Types)	(See MYA, Listed Above)			
Plastic Molding Dies	H & R PLASTIC MOLD L		C 0.50, Mn 1.00, Si 0.30, Cr 1.10, Mo 0.25	Prehardened Mach. 80 No Movement
Plastic Molding Dies (Machined Cavity Dies)	H & R MULTIMOLD Oil Hardening	P20	C 0.35, Mn 0.70, Si 0.45, Cr 0.80, Mo 0.30	Oil
Plastic Molding Dies (Hobbing)	H & R PLASTIC MOLD Air Hardening	P4	C 0.07, Mn 0.40, Si 0.25, Cr 4.50, Mo 0.45	Air Movement +A

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Plastic Molding Dies (Hobbing)	H & R PLASTIC MOLD B Oil Hardening	P5	C 0.06, Mn 0.30, Si 0.15, Cr 1.00, Mo 0.25, Boron Added	Oil Movement + B
Plastic Molding Dies (Hobbing)	H & R PLASTIC MOLD C Oil Hardening	P1	C 0.06, Mn 0.15, Si 0.10	Oil Movement + B
Punching & Shearing	H & R CARBON Water Hardening	W1	C 0.90-1.05 or as specified, Mn 0.25, Si 0.20	Water, Brine Mach. 100 Movement + C
Punching & Shearing	H & R NON-TEMPERING Water, Oil Hardening	S6A	C 0.35, Mn 0.70, Cr 0.80, Mo 0.30, Si 0.45, Cu 0.30	Water, Oil Mach. 80 Movement ±B
Punching & Shearing	H & R SPECIAL CARBON Water Hardening	W1	C 0.90-1.05 or as specified, Mn 0.25, Si 0.20	Water, Brine Mach. 100 Movement + C
Punching & Shearing	H & R VANADIUM Water Hardening	W2	C 1.05-1.15, Mn 0.25, V 0.18, Si 0.20	Water, Brine Mach. 100 Movement + C
Punching & Shearing	(See H & R OIL HARDENING, H & R TUNGSTEN, OIL HARDENING, H & R No. 19, H & R No. 60, H & R No. 225, Listed Above)			
Shock Resisting (Intermittent Impact)	H & R No. 15 Oil Hardening	L2	C 0.45, Mn 0.55, Cr 0.95, V 0.20	Oil Mach. 80 Movement + B
Shock Resisting (Intermittent Impact)	H & R No. 85 Oil Hardening	L2	C 0.50, Mn 0.80, Cr 0.95, V 0.20, Si 0.25	Oil Mach. 75 Movement —B
Shock Resisting (Repeated, Intermittent Impact)	(See MYA, H & R No. 60, Listed Above)			
Shock Resisting (Repeated Impact)	H & R CM		C 0.50, Mn 0.70, Si 0.25, Cr 3.25, Mo 1.40	Air Mach. 90 Movement + A
Shock Resisting (Repeated Impact)	H & R SILICO Water, Oil Hardening	S2	C 0.50, Mn 0.45, Mo 0.50, V 0.20, Si 1.10	Water, Oil Mach. 65 Movement + B

JAMISON STEEL CORP., 13039 S. Main, Los Angeles 61, Calif. — Listing No. 41

Cold Work Dies (Blanking, Cold Forming)	AIRTREAT Air Hardening		C 1.00, Mn 0.60, Cr 5.25, Mo 1.10, V 0.20, Si 0.25	Air Movement A
Cold Work Dies (Blanking, Cold Forming)	DENSITE Air Hardening		C 1.50, Mn 0.30, Cr 12.00, Mo 0.85, V 0.85, Si 0.40	Air Movement A
Cold Work Dies (Blanking, Cold Forming)	JAMISON SPECIAL Water Hardening		C 1.00, Mn 0.25, Cr 0.16, V 0.05, Si 0.25	Water Movement C
Cold Work Dies (Blanking, Cold Forming)	K-46 Oil Hardening, Nondeforming		C 0.90, Mn 1.15, Cr 0.50, W 0.50, V 0.10, Si 0.25	Oil Movement A
Cold Work Dies	MOLY-TUNGSTEN HIGH SPEED STEEL		C 0.82, Mn 0.25, Cr 4.15, W 6.20, Mo 5.00, V 1.90, Si 0.25	Oil, Air Movement A
Cold Work Dies	18-4-1 HIGH SPEED STEEL		C 0.72, Mn 0.25, Cr 4.10, W 18.20, V 1.15, Si 0.30	Oil, Air Movement A
Hot Work Dies (Hot Forming, Punch & Shear)	DIECAST #1 Air Hardening, Heat Resistant		C 0.37, Cr 5.25, Mo 1.35, V 0.50	Air Movement A
Hot Work Dies (Hot Forming, Punch & Shear, Shock Resistant)	HICKORY Oil Hardening, Shock Resistant		C 0.50, Si 0.90, Mn 0.25, Cr 1.05, W 2.45	Oil Movement B

JESSOP STEEL CO., 500 Green St., Washington, Pa. — Listing No. 42

Cold Heading	NEW PROCESS COLD HEADER Water Hardening	W1	C 1.00, Mn 0.25, Si 0.18	Water Mach. 100 Movement B
Cold Heading	TRU-HEDER DIE		C 1.40, Mn 0.40, V 3.50	Water Mach. 75 Movement B
Cold Work (Dies, Rolls, etc.)	B X 3		C 2.45, Mn 0.65, Cr 5.00, V 4.50, Mo 1.10	Air Mach. 75 Movement A
Cold Heading	NEW PROCESS COLD HEADER Water Hardening	W1	C 1.00, Mn 0.25, Si 0.18	Water Mach. 100 Movement B
Cold Work (Dies, Rolls, etc.)	3-C CAST-TO-SHAPE		C 1.55, Cr 13.00, Ni 0.15, Mo 1.15, V 0.55, Co 0.70	Air Mach. 60 Movement A
Cold Work (Dies, Rolls, etc.)	3-C SPECIAL-CAST-TO-SHAPE	D5	C 1.55, Cr 13.00, Ni 0.40, Mo 1.15, V 0.50, Co 3.25	Air Mach. 60 Movement A
Cold Work Dies (Lamination Dies, etc.)	C.N.S.-1 Air Hardening	D2	C 1.50, Mn 0.30, Cr 12.00, Mo 0.75, V 0.80, Si 0.40	Air Mach. 50 Movement B
Cold Work Dies (Lamination Dies, etc.)	C.N.S.-2 Oil Hardening	D3	C 2.25, Mn 0.42, Cr 12.00, V 0.20, Si 0.45	Oil Mach. 45 Movement B
Cold Work Dies (Lamination Dies, etc.)	C.N.S.-3 Air Hardening	D4	C 2.25, Mn 0.42, Cr 12.00, V 0.20, Si 0.45, Mo 1.00	Air Mach. 45 Movement A
Cold Work Dies	DICA (Flame Hard.) CAST-TO-SHAPE		C 0.42, Mn 0.75, Si 0.25, Cr 1.00, Mo 0.20	Oil Mach. 85 Movement B
Cold Work Dies	LION EXTRA Water Hardening	W1	C 0.60-1.30, Mn 0.30, Si 0.25	Water Mach. 100 Movement B
Cold Work Dies	LION Water Hardening	W1	C 0.60-1.30, Mn 0.30, Si 0.25	Water Mach. 100 Movement B
Cold Work Dies	SPECIAL OIL HARDENING Oil Hardening	O2	C 0.90, Mn 1.75, Cr 0.20, Si 0.35	Oil Mach. 100 Movement A
Cold Work Dies	TRUFORM-CAST-TO-SHAPE	O1	C 1.00, Mn 1.15, Si 0.35, Cr 0.50, W 0.50	Oil Mach. 90 Movement B
Cold Work Dies	TRUFORM Oil Hardening	O1	C 0.90, Mn 1.20, Cr 0.50, W 0.50, Si 0.30, V 0.20	Oil Mach. 90 Movement A
Cold Work (Dies, Rolls, etc.)	TRU WEAR	D7	C 2.40, Mn 0.40, Cr 12.25, V 3.75, Mo 1.10	Air Mach. 60 Movement + A
Cold Work (Lamination Dies)	(See, B X 3 and TRU WEAR, Listed Above)			
Cold Work Dies	WASHINGTON Water Hardening	W1	C 0.60-1.30, Mn 0.30, Si 0.25	Water Mach. 100 Movement B
Cold Work Dies (Lamination Dies, etc.)	WINDSOR Air Hardening	A2	C 1.00, Mn 0.50, Cr 5.00, Mo 1.25, V 0.30, Si 0.25	Air Mach. 70 Movement B
Cold Work Dies	WINDSOR—CAST-TO-SHAPE	A2	C 1.00, Mn 0.35, Cr 5.25, Mo 1.00, V 0.25	Air Mach. 75 Movement A

★ Last column indicates suggested Quenching Medium; Machinability Annealed, using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Cold Work Dies	JESS-AIR	A6	C 0.70, Mn 2.00, Cr 1.00, Mo 1.30	Air Mach. 85 Movement A
Cold Work Dies & Cams	3312—CAST-TO-SHAPE Carburizing		C 0.12, Mn 0.45, Si 0.28, Ni 3.40, Cr 1.40	Oil Mach. 85 Movement B
Cutting Tools	M-3 High Speed	M3	C 1.03, Mn 0.30, Cr 4.00, W 6.00, V 2.50, Mo 5.50	Air, Oil Mach. 60 Movement B
Cutting Tools	M-10 High Speed	M10	C 0.86, Mn 0.30, Cr 4.00, V 2.00, Mo 8.50	Air, Oil Mach. 65 Movement B
Cutting Tools	T-8 High Speed	T8	C 0.79, Mn 0.30, Cr 4.00, W 14.00, V 2.00, Mo 0.75, Co 5.00	Air, Oil Mach. 60 Movement B
Cutting Tools	MOGUL High Speed	M1	C 0.78, Mn 0.25, Cr 3.80, W 1.50, Mo 8.70, V 1.15, Si 0.30	Oil Mach. 65 Movement B
Cutting Tools	MUSTANG High Speed	M2	C 0.84, Mn 0.25, Cr 4.20, W 6.35, Mo 5.00, V 1.95, Si 0.25	Oil Mach. 60 Movement B
Cutting Tools	MUSTANG SPECIAL	M35	C 0.84, Mn 0.30, Cr 4.20, V 1.95, Mo 5.00, W 6.35, Co 5.40	Air or Oil Mach. 50 Movement A
Cutting Tools	PURPLE LABEL High Speed	T4	C 0.74, Mn 0.28, Cr 4.20, W 18.50, Mo 0.50 max, V 1.10, Co 5.00	Oil Mach. 50 Movement B
Cutting Tools	PURPLE LABEL EXTRA High Speed	T5	C 0.78, Mn 0.28, Cr 4.20, W 18.50, Mo 0.75, V 1.95, Co 7.90	Oil Mach. 50 Movement B
Cutting Tools	KING COBALT High Speed	T6	C 0.78, Mn 0.30, Cr 4.20, W 19.50, Mo 0.75, V 1.75, Co 11.50	Oil Mach. 45 Movement B
Cutting Tools	T-15 High Speed	T15	C 1.55, Cr 4.75, W 12.50, V 5.00, Co 5.00	Air or Oil Mach. 45 Movement A
Cutting Tools	SUPREMUS High Speed	T1	C 0.73, Mn 0.28, Cr 4.00, W 18.00, V 1.10	Oil Mach. 60 Movement B
Cutting Tools	SUPREMUS EXTRA High Speed	T2	C 0.85, Mn 0.30, Cr 4.00, W 18.50, Mo 0.75, V 2.10	Oil Mach. 60 Movement B
Cutting Tools	RAPID FINISHING Water Hardening	F3	C 1.35, Mn 0.35, Cr 0.75, W 3.75	Water Mach. 85 Movement B
Cutting Tools	(See C.N.S.-1, C.N.S.-2, TRUFORM, WINDSOR, Listed Above)			
Cutting Tools (Roughing, Finishing)	(See LION, LION EXTRA, WASHINGTON, RAPID FINISHING, Listed Above)			
Diecasting Dies	DICA B Air Hardening	H12	C 0.35, Mn 0.35, Cr 5.00, W 1.15, Mo 1.50, V 0.20, Si 1.00	Air Mach. 75 Movement B
Diecasting Dies	3-C SPECIAL Air Hardening	D5	C 1.55, Mn 0.30, Cr 13.00, Mo 1.15, Co 3.25, Ni 0.40, V 0.50	Air Mach. 75 Movement B
Gages	(See TRUFORM, SPECIAL OIL HARDENING, Listed Above)			
Hot Work Dies	DICA B—MOD. CAST-TO-SHAPE	H11	C 0.35, Mn 0.40, Si 0.95, Cr 4.85, V 0.35, Mo 1.40	Air Mach. 75 Movement B
Hot Work Tools & Dies	DICA B—MODIFIED	H11	C 0.36, Mn 0.35, Cr 4.85, V 0.20, Mn 1.50	Air Mach. 75 Movement B
Hot Work Tools & Dies	DICA B—VANADIUM	H13	C 0.36, Mn 0.35, Cr 4.85, V 1.00, Mo 1.50	Air Mach. 75 Movement B
Hot Work Tools & Dies	J HOT WORK Air Hardening		C 0.62, Mn 0.30, Si 0.35, Cr 3.80, Mo 0.55, V 0.55	Air Mach. 75 Movement B
Hot Work Tools & Dies	JJ HOT WORK Air Hardening		C 0.92, Mn 0.30, Si 0.35, Cr 3.80, Mo 0.55, V 0.55.	Air Mach. 75 Movement B
Hot Work Tools & Dies	2B-LC Oil Hardening	H21	C 0.30, Mn 0.30, Si 0.30, Cr 3.00, W 10.00, V 0.30	Oil, Air Mach. 75 Movement B
Shear Blades, Chisels, Dies, Forming Tools, Punches	RTS Water Hardening	S2	C 0.55, Mn 0.50, Mo 0.45, Si 0.80	Water, Oil Mach. 90 Movement B
Shock Resisting Tools, Chisels	MAGIC Oil Hardening		C 0.52, Mn 0.90, Mo 1.00, Si 2.00	Water, Oil Mach. 75 Movement B
Shock Resisting Tools, Chisels	No. 259	S5	C 0.52, Mn 0.95, Si 2.00, Mo 0.50, V 0.20, Cr 0.15	Water, Oil Mach. 75 Movement B
Shock Resisting Tools Shear Blades (Pneumatic Tools)	TOP NOTCH Oil Hardening	S1	C 0.50, Mn 0.30, Cr 1.15, W 2.40, V 0.20	Oil Mach. 80 Movement B
Tools & Dies (Shallow Hardening)	(See NEW PROCESS COLD HEADER, WASHINGTON, Listed Above)			

KENNAMETAL INC., Latrobe, Pa.

Listing No. 43

Cutting Tools (Heavy Rough Turning, Forged, Rolled Steel)..KM, Carbide

Cutting Tools (Moderate Roughing Cast Steel, Scaly, Sandy Cast Iron) ..... K28, Carbide

Cutting Tools (General Machining of Steel) ..... K21, Carbide

Cutting Tools (Moderate Finishing Cuts, Steel) ..... K3H, Carbide

Cutting Tools (Abrasive Cuts on Steel, Tools that Dwell)..K4H, Carbide

Cutting Tools (General Finishing Steel, Precision Boring)..K5H, Carbide

Cutting Tools (High Velocity Cutting, Steel, Moderate Cuts).K7H, Carbide

Cutting Tools (High Velocity Finishing, Steel, Light Cuts, Inserts Only) ..... K165, Carbide

Cutting Tools (Heavy Roughing or Planing of Cast Iron) ....K1, Carbide

Cutting Tools (General Machining, Cast Iron, Nonmetallics)..K6, Carbide

Cutting Tools (Fine Finishing, Precision Boring of Cast Iron & Nonferrous Materials) ..... K8, Carbide

Cutting Tools (Fine Finishing Cuts on Nonferrous & Plastics) K11, Carbide

Deflection Resistant Machine Elements (Grinding Quills, Boring Bars & Machine Elements Requiring High Modulus of Elasticity) ..... K95, K96, Carbide

Dies, Cold Draw, Nongalling, H.D. (Sizing Mandrels, H.D. Burnishing Rolls) ..... K82, Carbide

Dies, Cold Draw, Nongalling (Bars, Tubes, Sizing Mandrels, Wire Flattening Rolls) ..... K84, Carbide

Dies, Cold Draw, Nongalling (Wire, Rods, Tubes, Burnishing, Flaring) ..... K86, Carbide

Dies, Cold Work, Heavy Shock (Blanking—3/16 in. Steel, Cold Heading, Nibbling, Swaging) ..... K90, Carbide

Dies, Cold Work, Medium to Heavy Shock (Blanking—to 1/16 in. Steel, Crushing Hammers, Rivet Sets) ..... K91, Carbide

Dies, Cold Work, Medium Shock, Lamination (Blanking to 0.040 in. Steel, Heavy Forming Dies, Heading Hammers) ..... K92, Carbide

Dies, Cold Work, Light Shock (Blanking Light to Medium, Slitter Knives, Can Stock, Curling Rolls, Cold Draw)..K94, Carbide

Dies, Wear Resistant, Light Shock (Light Blanking, Light Heading Hammers) ..... K95, Carbide

Dies, Wear Resistant, No Shock (Compacting, Blanking, Paper Slitting) ..... K96, Carbide

Dies, Cold Impact Extrusion ..... E7926 & 3402, Carbide

Dies, Cold Impact Extrusion, Heavy Duty ..... 3109, Carbide

High Density Materials (Heavy Tungsten Alloys, Density 17.0 gm/cc to 18.5 g/cc) ..... KENNERTIUM

Wear Resistant Parts (Adaptable to Long, Slender Extruded Shapes) ..... KE7, Carbide

Heat Resistant Applications (Available in Compositions for: Hot Machining, Flash Trimming, Hot Spinning, Hot Die Applications) ..... KENTANIUM

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.

KLOSTER STEEL CORP., 224-228 N. Justine St., Chicago 7, Ill. — Listing No. 44

Cold Work Dies	PURE-ORE AIR-CHROM Air Hardening	A2	C 1.00, Mn 0.57, Cr 5.30, Mo 1.00, V 0.26, Si 0.23	Air
Cold Work Dies	PURE-ORE AIR-EEZ	A4	C 0.95, Mn 2.00, Cr 2.20, Si 0.35, Mo 1.10, Lead 0.15-0.35	Air Free Machining
Cold Work Dies	PURE-ORE EXTRA Water Hardening	W1	Carbon as Desired	Water
Cold Work Dies	PURE-ORE SPECIAL Water Hardening	W1	Carbon as Desired	Water
Cold Work Dies	PURE-ORE STANDARD Water Hardening	W1	Carbon as Desired	Water
Cold Work Dies	PURE-ORE No. 14		C 1.00, Mn 0.35, Cr 0.45, Si 0.23	Water
Cold Work Dies (Blanking, Forming)	PURE-ORE HI-RUN Hi-Chrome, Hi-Carbon	D2	C 1.50-1.60, Mn 0.35, Cr 11.50-12.50, Mo 0.75-0.90, V 0.25-0.35, Si 0.40-0.50	Air
Cold Work Dies	KLOSTER SWED-OIL Oil Hardening	O1	C 0.95-1.00, Mn 1.10-1.20, Cr 0.45-0.50, W 0.45-0.50, V 0.20, Si 0.25-0.35	Oil
Cutting Tools	PURE-ORE CLIPPER High Speed	T1	C 0.55-0.75, Mn 0.15-0.35, Cr 3.80-4.25, W 17.75-18.50, V 0.90-1.25, Si 0.20-0.35	Oil
Hot Work Dies	PURE-ORE D-C-33 Hot Work	H12	C 0.33, Mn 0.20-0.40, Cr 4.50-5.50, W 1.35-1.75, Mo 1.45-1.85, Si 0.85-1.25	Air
Hot Work Dies	PURE-ORE D-C-33-VA	H13	C 0.38, Si 1.00, Mo 1.25, Cr 5.25, V 1.05	Air
Hot Work Dies	PURE-ORE D-C-66 Hot Work	H21	C 0.30, Mn 0.31-0.43, Cr 3.50, W 8.50-9.00, V 0.27, Si 0.29-0.36	Air
Shock Resisting	PURE-ORE CHIZ-ALAIR		C 0.50, Si 0.25, Mn 0.70, Cr 3.25, Mo 1.40	Air
Shock Resisting	CHIZ-ALOY	S1	C 0.45, Mn 0.30, Cr 1.00-1.25, W 2.50, Si 0.90, V 0.20-0.25	Oil
Shock Resisting	PURE-ORE SUPER ALLOY	S1	C 0.45-0.50, Mn 0.35, Cr 1.25, W 2.25-2.50, V 0.20-0.25, Si 0.90-1.00	Oil

LATROBE STEEL CO., Latrobe, Pa. — Listing No. 45

Brick Mold Liners	BR-3		C 2.80, Cr 5.25, V 4.50, Mo 1.10	Air	Mach. 60 Movement +A
Cold Work Dies (Blanking, Cold Forming)	BADGER Oil Hardening	O1	C 0.94, Si 0.30, Mn 1.20, W 0.50, Cr 0.50	Oil	Mach. 90 Movement +A
Cold Work Dies (Blanking, Cold Forming)	BR-2 FM Air Hardening		C 2.50, Si 0.30, Mn 0.75, Cr 5.25, Mo 1.10, V 4.50	Air	Mach. 60 Movement +A
Cold Work Dies (Blanking, Cold Forming)	BR-4 FM Air Hardening	D7	C 2.30, Si 0.40, Mn 0.40, Cr 12.50, V 4.00, Mo 1.10	Air	Mach. 65 Movement +A
Cold Work Dies (Blanking, Cold Forming)	CARBON, SPECIAL, EXTRA & STANDARD Water Hardening	W1	C 1.05, Si 0.20, Mn 0.20, S 0.015, P 0.015, Cr 0.08	Water	Mach. 100 Movement —B
Cold Work Dies (Blanking, Cold Forming)	COBALT CHROME FM Air Hardening	D5	C 1.50, Si 0.50, Mn 0.25, Cr 12.25, Mo 0.85, Co 3.10	Air	Mach. 80 Movement +A
Cold Work Dies (Blanking, Cold Forming)	GSN FM Oil Hardening	D3	C 2.10, Si 0.50, Mn 0.50, Cr 13.00	Oil	Mach. 75 Movement +A
Cold Work Dies (Blanking, Cold Forming)	MGR Air Hardening	A8	C 0.55, Si 0.95, Mn 0.30, W 1.20, Cr 5.00, Mo 1.20	Air	Mach. 85 Movement +A
Cold Work Dies (Blanking, Cold Forming)	OLYMPIC FM Air Hardening	D2	C 1.50, Si 0.30, Mn 0.30, Cr 12.00, V 1.00, Mo 0.75	Air	Mach. 80 Movement +A
Cold Work Dies (Blanking, Cold Forming)	SELECT B FM Air Hardening	A2	C 1.00, Si 0.30, Mn 0.70, Cr 5.25, V 0.25, Mo 1.10	Air	Mach. 90 Movement +A
Cold Work Dies (Cold Forming)	HEDERVAN Water Hardening		C 1.40, Si 0.35, Mn 0.40, V 3.50, Cr 0.15 max, Mo 0.10 max	Water	Mach. 80 Movement ±C
Cutting Tools (Roughing, Finishing)	ELECTRITE CORSAIR XL Oil Hardening, High Speed	M3	C 1.02, W 6.10, Cr 4.00, V 2.40, Mo 6.00	Oil	Mach. 70 Movement +A
Cutting Tools (Roughing, Finishing)	ELECTRITE CRUSADER XL Oil Hardening, High Speed	M3	C 1.20, W 6.00, Cr 4.10, V 3.20, Mo 6.00	Oil	Mach. 70 Movement +A
Cutting Tools (Roughing, Finishing)	ELECTRITE DOUBLE SIX M-2 XL Oil Hardening, High Speed	M2	C 0.85, W 6.30, Cr 4.15, V 1.85, Mo 5.05	Oil	Mach. 75 Movement +A
Cutting Tools (Roughing, Finishing)	ELECTRITE STARK Oil Hardening, High Speed	M4	C 1.28, W 5.50, Cr 4.50, V 4.00, Mo 4.50	Oil	Mach. 65 Movement +A
Cutting Tools (Roughing, Finishing)	ELECTRITE DYNAVAN XL Oil Hardening, High Speed	T15	C 1.50, W 13.50, Cr 4.50, V 4.75, Co 5.00, Mo 0.50	Oil	Mach. 45 Movement +A
Cutting Tools (Roughing, Finishing)	ELECTRITE SUPER COBALT Oil Hardening, High Speed	T5	C 0.85 W 18.75, Cr 4.10, V 2.15, Mo 0.80, Co 9.00	Oil	Mach. 45 Movement +A
Cutting Tools (Roughing, Finishing)	ELECTRITE TATMO XL Oil Hardening, High Speed	M1	C 0.80, Si 0.30, Mn 0.25, Cr 4.00, W 1.50, Mo 8.50, V 1.00	Oil	Mach. 80 Movement +A
Cutting Tools (Roughing, Finishing)	ELECTRITE TNW XL Oil Hardening, High Speed	M10	C 0.87, Si 0.25, Mn 0.25, Cr 4.00, Mo 8.00, V 1.90	Oil	Mach. 75 Movement +A
Cutting Tools (Roughing, Finishing)	ELECTRITE TATMO V Oil Hardening, High Speed	M7	C 1.00, W 1.75, Cr 4.00, V 2.00, Mo 8.75	Oil	Mach. 75 Movement +A
Cutting Tools (Roughing, Finishing)	ELECTRITE ULTRAVAN Oil Hardening, High Speed	M15	C 1.50, W 6.30, Cr 4.25, V 4.75, Mo 5.00, Co 5.00	Oil	Mach. 45 Movement +A
Cutting Tools (Roughing, Finishing)	ELECTRITE NO. 1 XL Oil Hardening, High Speed	T1	C 0.75, W 18.00, Cr 4.10, Mo 0.70, V 1.10	Oil	Mach. 75 Movement +A
Diecasting Dies (Aluminum, Zinc, Magnesium)	VISCOUNT 20 Free Machining, VDC Type Air Hardening	H13	C 0.40, Si 1.00, Mn 0.30, Cr 5.00, Mo 1.20, V 1.00, plus alloy sulfides	Air	Mach. 100 Movement +A

★ Last column indicates suggested Quenching Medium; Machinability Annealed, using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Diecasting Dies (Aluminum, Zinc, Magnesium)	VISCOUNT 44 PREHARDENED	H13	C 0.40, Si 1.00, Mn 0.30, Cr 5.00, Mo 1.20, V 1.00, plus alloy sulfides	Prehardened Mach. 70 No Movement
Diecasting Dies (Zinc)	CASCADE Prehardened	P21	C 0.20, Si 0.30, Mn 0.30, Cr 0.25, Ni 4.10, V 0.20, Al 1.20	Prehardened Mach. 80 No Movement
Diecasting Dies (Aluminum, Zinc, Magnesium)	VDC Air Hardening	H13	C 0.40, Si 1.00, Mn 0.30, Cr 5.00, Mo 1.20, V 1.00	Air Mach. 80 Movement +A
Gages	(See OLYMPIC FM, SELECT B FM, BADGER, Listed Above)			
High Stress & High Wear Machinery Parts	STAMINAL Air Hardening		C 0.55, Si 1.00, Mn 0.90, Cr 0.40, Ni 2.70, V 0.13, Mo 0.45	Air, Oil Mach. 55 Movement +A
High Stress & High Wear Machinery Parts	(See VISCOUNT 44 PREHARDENED, Listed Above)			
Hot Work Dies (Forming, Punching & Shearing)	(See VDC, Listed Above)			
Hot Work Dies (Forming, Punching & Shearing)	CLW Oil Hardening	H21	C 0.30, Si 0.45, Mn 0.25, W 9.15, Cr 3.30, V 0.50	Oil Mach. 70 Movement +B
Hot Work Dies (Forming, Punching & Shearing)	LPD Air Hardening	H12	C 0.35, Si 1.00, Mn 0.30, Cr 5.00, Mo 1.60, W 1.30, V 0.30	Air Mach. 80 Movement +A
Hot Work Dies (Forging Dies)	KONCOR		C 1.10, Si 1.00, Cr 5.25, V 4.00, Mo 1.10	Air Mach. 70 Movement +A
Hot Work Dies (Forging Dies)	PYRO-VAN		C 0.75, Si 1.00, Cr 5.25, V 2.50, Mo 1.10	Air Mach. 75 Movement +A
Hot Work Dies (Extrusion Dies)	DART	H10	C 0.40, Si 1.00, Cr 3.25, V 0.40, Mo 2.50	Air Mach. 80 Movement +A
Hot Work Dies (Forming, Punching, Shearing, Extrusion)	(See VISCOUNT 20, VISCOUNT 44 PREHARDENED, VDC & LPD, Listed Above)			
Plastic Molding Dies (Machine Cut Cavity Dies)	(See CASCADE, SELECT B FM, Listed Above)			
Punching & Shearing	(See OLYMPIC FM, COBALT CHROME FM, SELECT B FM, MGR, BADGER, STAMINAL, Listed Above)			
Shock Resisting (Repeated, Intermittent Impact)	(See STAMINAL, MGR, Listed Above)			
Thermostat Parts	INVAR		C 0.13, Mn 0.80, Si 0.25, Ni 38.00	Mach. 40 Movement O
Wear Parts	(See BR-4 FM, Listed Above)			
Plastic Molding Master Hobs	(See MGR & STAMINAL, Listed Above)			

LEHIGH STEEL CORP., Bethune & Greenwich Streets, New York 14, N. Y. — Listing No. 46

Blacksmith Tools & Chisels	UTILITY Water Hardening	W1	C 0.75-1.10	Water Movement C
Cold Work Dies	N-C ALLOY Oil Hardening	L6	C 0.75, Mn 0.45, Cr 1.00, Ni 1.65, Si 0.25	Oil Mach. 80 Movement A
Cold Work Dies	TORPEDO Oil Hardening	O1	C 0.90-1.05, Mn 1.20, Cr 0.50, V 0.20, W 0.50	Oil Mach. 85 Movement A
Cold Work Dies (Blanking, Cold Forming)	HYCO-1 Oil Hardening	D2	C 1.50, Mn 0.35, Cr 12.00, Mo 0.80, V 0.90, Si 0.30	Oil Mach. 60 Movement A
Cold Work Dies (Blanking, Cold Forming)	HYCO-2 Air, Oil Hardening	D3	C 2.25, Cr 11.50, Mo 0.80, V 0.20 Si 0.30	Air, Oil Mach. 40 Movement A
Cutting Tools (Finishing & Roughing)	LEHIGH XXX High Speed	T2	C 0.80, Cr 4.25, W 18.00, V 2.00	Oil Movement B
Cutting Tools (Roughing)	LEHIGH SS High Speed	T6	C 0.70, Cr 4.50, Mo 0.75, Co 11.50, Mn 0.25, W 18.00, V 1.50, Si 0.25	Oil Movement B
Dies & Blanking (Cold Work)	AIRTEM Air Hardening	A2	C 1.00, Mn 0.60, Cr 5.50, Mo 1.10, V 0.20	Air Mach. 70 Movement A
Dies & Tools	CONQUEROR Water Hardening	W1	C 0.75-1.10, Mn 0.25, Si 0.30	Water Mach. 100 Movement C
Hot Work Dies	FERNO Oil Hardening	H12	C 0.37, Cr 5.00, W 1.25, Mo 1.30, V 0.40, Si 1.00, Mn 0.35	Oil Mach. 85 Movement A
Hot Work (High Temperature)	VOLCANO Air Hardening	H12	C 0.40, Cr 2.00, W 12.00, V 0.35, S 0.30	Air Mach. 65 Movement A
Hollow Die Steel	LESCALLOY Oil Hardening		Special Analysis	
Machine Parts	CROMA ALLOY Water & Oil Hardening		Special Analysis	Water or Oil Mach. 90 Movement B
Punches & Dies	APEX DRILL RODS Water Hardening	C1	C 1.00	Water Mach. 100 Movement B
Shearing & Punching	ROCKET Water or Oil Hardening	S5	C 0.60, Mn 0.75, Si 1.85, Mo 0.50	Oil or Water Mach. 70 Movement B
Shock Resisting	LECO NONTEMPERING		Special Analysis	Water Mach. 80 Movement C
Wear Resisting	ABRASEX Bars & Plates Water & Oil Hardening		Special Analysis	Water or Oil Mach. 90 Movement B

LUDLOW STEEL CORP., 5439 Perkins Rd., Bedford, Ohio — Listing No. 47

Abrasive Resistant Plate (Heat Treated)	CENTREX RHINO-TUF			
Brake Dies (Heat Treated)	CENTREX PRESS BRAKE DIE			
Bushings (Heat Treated)	CENTREX H. T. RING FORGINGS			
Cold Work Dies (Blanking, Cold Forming)	TERRA			Oil Movement B
Cutting Tools (Roughing, Finishing, Heat Treated)	COBRA (HIGH SPEED)			

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Hand Tools (Nontempering)	LUDLOY			Water
High Tensile Shafting, Turned, Ground & Polished (Heat Treated)	CENTREX P & G			
High Tensile Machine Parts & Shafting. (Heat Treated)	CENTREX H. T.			
High Tensile Studs, Bolts & Nuts. (Heat Treated)	CENTREX H. T. THREADED BARS & NUTS			
Keys	CENTREX PRECISION KEY STOCK			
Pneumatic Tools	LUSCO			Oil Movement B
Wearing Strips (Heat Treated, Abrasion Resistant)	CENTREX RHINO-TUF WEARING STRIPS			

P. F. McDONALD & CO., 17 King Terminal, Boston 27, Mass. — Listing No. 48

Blacksmithing Tools	MACCO SOLID	W1	C 0.75-0.85, Mn 0.15-0.35, Si 0.15-0.30	Water, Oil Movement ±B
Cold Work Dies (Blanking, Forming)	MACCO EXTRA	W1	C 0.95-1.10, Mn 0.15-0.35, Si 0.10-0.35	Water Mach. 100 Movement + C
Cold Work Dies (Blanking, Forming)	MACCO STANDARD	W1	C 0.95-1.10, Mn 0.15-0.35, Si 0.10-0.35	Water Mach. 100 Movement + C
Cold Work Dies (Blanking, Punching, Cold Forming)	MACCO KROMAX 1 Air Hardening	D2	C 1.50, Mn 0.35, Cr 11.90, Mo 0.90, V 0.28, Si 0.23	Air, Oil Mach. 60 Movement + A
Cold Work Dies (Blanking, Punching, Cold Forming)	MACCO KROMAX 2 Air Hardening	D5	C 1.40, Mn 0.32, Cr 12.50, Mo 0.85, Co 3.25, Si 0.42	Air Mach. 60 Movement + A
Cold Work Dies (Cold Heading)	MACCO B-29 Water Hardening	W2	C 0.98, Mn 0.26, V 0.20, Si 0.20	Water Mach. 100 Movement —B
Cold Work Punches, Dies (All Kinds)	MACCO 35 AIR HARD	A2	C 1.00, Mn 0.60, Cr 5.25, Mo 1.15, V 0.25, Si 0.25	Air Mach. 70 Movement + A
Cold Work Punches, Dies (All Kinds)	MACCO AL-4 Air Hardening	A4	C 0.95, Mn 2.00, S 0.35, Cr 2.20, Mo 1.10, Lead Added	Air Mach. 90 Movement + A
Cold Work Punches, Dies (All Kinds)	MACCO ROYAL CROWN Oil Hardening	O1	C 0.90, Mn 1.20, Cr 0.50, W 0.50, V 0.25, Si 0.30	Oil Mach. 90 Movement + B
Cold Work Punches, Dies (All Kinds)	MACCO SPECIAL Water Hardening	W1	C 1.01, Mn 0.20, Si 0.16	Water Mach. 100 Movement + C
Cutting Tools	MACCO ENORMOUS High Speed	T6	C 0.83, Mn 0.25, Cr 4.50, W 22.00, Mo 1.00, V 2.00, Co 10.00, Si 0.27	Oil Mach. 55 Movement ±A
Cutting Tools	MACCO N.L.S. SHANK STEEL	W1	C 0.95, Mn 0.35, P 0.025, S 0.025, Si 0.30	Water Mach. 100 Movement + B
Cutting Tools	MACCO RADIO High Speed	M2	C 0.84, Mn 0.25, Cr 4.00, W 6.50, Mo 5.00, V 1.90, Si 0.26	Oil Mach. 65 Movement ±A
Cutting Tools	MACCO SUPERIOR High Speed	T1	C 0.75, Mn 0.28, Cr 4.00, W 18.00, V 1.00, Si 0.22	Oil Mach. 60 Movement ±A
Cutting Tools	MACCO SUPER MOLY High Speed	M1	C 0.80, Mn 0.25, Cr 3.90, W 1.70, Mo 8.80, V 1.10, Si 0.24	Oil Mach. 55 Movement + A
Cutting Tools (Rough Drilling)	HOLLOW DRILL	W1	C 0.75-0.85, Mn 0.15-0.35, Si 0.15-0.30	Water, Oil Movement ±B
Cutting Tools (Stone Drilling)	MACCO BROACHING AND CHANNELLER	W1	C 0.75-0.85, Mn 0.15-0.35, Si 0.15-0.30	Water Movement + C
Diecasting Lens Molds	MACCO LENS MOLD High Speed		C 0.40, Mn 0.25, Cr 5.25, W 4.65, Si 1.00	Air, Oil Mach. 70 Movement + A
Diecasting (Magnesium, Aluminum)	MACCO 33 Air Hardening		C 0.40, Mn 0.30, Cr 5.50, Mo 1.40, V 1.00, Si 1.00	Air Mach. 70 Movement + A
Diecasting (Zinc)	MACCO 99 Oil Hardening		C 0.35, Mn 0.80, Cr 0.85, Mo 0.35, Si 0.60	Oil Mach. 70 Movement + A
Hot Work Dies	MACCO M L Air Hardening	H12	C 0.35, Mn 0.30, Cr 5.00, W 1.50, Mo 1.65, Si 1.00	Air Mach. 70 Movement + A
Hot Work Dies	MACCO M.L.V.	H12	C 0.35, Mn 1.05, Si 1.05, Cr 5.15, Mo 1.55, W 1.25, V 0.30	Air Mach. 70 Movement + A
Hot Work Dies	MACCO P-125 High Speed	H25	C 0.25, Mn 0.28, Cr 4.20, W 15.50, V 0.50, Si 0.27	Oil Mach. 65 Movement + A
Hot Work Dies	MACCO P-150 High Speed	H24	C 0.51, Mn 0.29, Cr 2.90, W 15.30, V 0.60, Si 0.25	Oil Mach. 65 Movement + A
Hot Work Dies	MACCO P-175 High Speed	H21	C 0.31, Mn 0.29, Cr 3.30, W 9.50, V 0.50, Si 0.43	Oil Mach. 65 Movement + A
Impact Tools, Chisels, Shear Blades	MACCO FOOLPROOF Oil Hardening	S1	C 0.55, Mn 0.25, Cr 1.40, W 2.40, V 0.30, Si 0.25	Oil Mach. 65 Movement ±B
Plastic Molding Dies	MACCO HOBOMOLD "A"	P4	C 0.07, Mn 0.40, Si 0.25, Cr 4.50, Mo 0.45	Air Mach. 60 Movement + A
Plastic Molding Dies	MACCO HOBOMOLD "B"	P5	C 0.06, Mn 0.30, Si 0.20, Cr 2.00	Oil Mach. 50 Movement + B
Plastic Molding Dies (Hubs)	MACCO HARD TUF Oil Hardening	S5	C 0.60, Mn 0.70, Mo 0.45, V 0.25, Si 1.85	Oil Mach. 75 Movement + B
Plastic Molding Dies (Hubs)	MACCO HOBOMOLD "C" Water, Oil Hardening	P1	C 0.04, Mn 0.20, Si 0.16	Oil, Water Mach. 40 Movement + C
Press Brake Dies	MACCO BRAKEDIE		C 0.50, Mn 0.85, Si 0.25, Cr 0.95, Mo 0.20	Oil Mach. 100 Movement + B
Punching, Shearing	(See MACCO FOOLPROOF, Listed Above)			
Shock Resisting (Intermittent Impact, Chisels)	MACCO SIL. MANG. Oil Hardening	S4	C 0.63, Mn 0.78, Si 2.00	Oil Mach. 75 Movement B
Special Purpose (Shock Resisting)	MACCO NON. TEMP.		C 0.35, Mn 0.70, Si 0.45, Cr 0.80, Mo 0.30, Cu 0.30	Water, Oil Mach. 80 Movement + B
Special Purpose (Cutting Tools)	MACCO W.J.F.		C 1.40, Mn 0.25, Si 0.15, W 4.00, Cr 0.60, V 0.35	Water Mach. 70 Movement + C

★ Last column indicates suggested Quenching Medium; Machinability Annealed, using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.

McINNES STEEL CO., 441 E. Main St., Corry, Pa. — Listing No. 49

Brake Dies	McINNES FOLDER-DIE		(Special steel "Brake Die," furnished heat treated ready for use)	

MARSHALL STEEL CO., Box 108, LaGrange, Ill. — Listing No. 50

Cold Work Dies	AIRCRAT	A2	C 1.00, Mn 0.50, Cr 5.00, Mo 1.00, V 0.25, Si 0.25	Air Mach. 65 Movement A
Cold Work Dies	OILCRAT	O1	C 0.95, Mn 1.20, W 0.50, Cr 0.50, Si 0.25, V 0.20	Oil Mach. 85 Movement +A
Cold Work Dies	SCRIBE-IT	O1	C 0.95, Mn 1.20, W 0.50, Cr 0.50, Si 0.25, V 0.20	Oil Mach. 85 Movement +A
Cold Work Dies	WATERCRAT	W1	C 1.05, Mn 0.35, Si 0.20, Cr 0.50	Water Mach. 100 Movement —B

MERIDIAN STEEL CO., 1776 Broadway, New York 19, N. Y. — Listing No. 51

Cold Work Dies (Blanking)	MERIDIAN AIR DIE Air Hardening		C 1.00, Mn 0.75, Cr 4.90, Mo 1.15, V 0.25, Si 0.30	Air Mach. 100 Movement A
Cold Work Dies (Blanking)	MERIDIAN OIL DIE Oil Hardening		C 0.95, Mn 1.10, Cr 0.50, W 0.60, V 0.20, Si 0.30	Oil Mach. 90 Movement A
Cold Work Dies (Shock Resisting)	MER-TEN		C 0.40, Mn 0.85, Si 0.35, Cr 1.00, Ni 1.00, Mo 0.45	Oil Mach. 70 Movement C
Cutting Tools	MERIDIAN CARBIDE		C 0.70, Mn 0.25, Cr 4.50, W 18.50, Mo 0.70, V 1.50, Co 12.00, Si 0.25	Oil Mach. 90 Movement B
High Wear Machine Parts, Special Liners (Shock Resistant)	MERIDIAN N.C. Oil Hardening		C 0.30, Ni 3.50, Cr 2.00	Oil Mach. 45 Movement B
Hot Work Dies	MERIDIAN H DIE Oil or Air Hardening		C 0.50, Mn 0.25, Cr 3.00, W 15.00, V 0.50, S 0.25	Oil or Air Mach. 90 Movement B
Punching & Shearing	MERICO #2		C 0.40, Mn 0.45, Si 0.70, Cr 0.75, Mo 0.55, Cu 0.65	Oil Mach. 65 Movement C
Shock Resisting	MERICO #1		C 0.35, Mn 0.40, Si 0.75, Cr 0.70, Mo 0.65, Cu 0.70	Water Mach. 60 Movement C
Shock Resisting Tool, Stonework Chisels, Pneumatic Tools (Repeated Impact)	MERCALLOY Oil Hardening		C 0.50, Mn 0.60, Mo 0.40, W 0.50, Si 1.35	Oil Mach. 65 Movement B
Special Tubing, Die Steel	MERIDIAN ALLOY Oil Hardening		C 1.10, Cr 1.50, Mn 0.45, Mo 0.30, Si 0.35	Oil Mach. 85 Movement A
Stripper Plates, Shear Blades, Wear Resistant Applications, Liners	MERIDIAN A.R. Oil Hardening		High Cr, Ni, Mn	Oil Mach. 60 Movement B

METAL CARBIDES CORP., 6001 Southern Blvd., Youngstown 12, Ohio — Listing No. 52

Cold Work Dies (Blanking)	TALIDE C-75, Carbide	W 65.72, Ta 4.69, C 4.59, Co 25.0
Cold Work Dies (Cold Forming)	TALIDE C-88, Carbide	W 84.49, C 5.51, Co 10.0
Cutting Tools(Roughing, Steel)	TALIDE S-88, Carbide	W 69.47, Ti 9.60, Ta 5.63, C 7.30, Co 8.0
Cutting Tools (Finishing, Steel)	TALIDE S-90, Carbide	W 69.00, Ti 10.00, Ta 6.10, C 7.40, Co 7.5
Cutting Tools (Light Finishing, Steel)	TALIDE S-92, Carbide	W 69.47, Ti 11.20, Ta 6.56, C 7.77, Co 5.0
Cutting Tools (Precision Boring, Steel)	TALIDE S-94, Carbide	W 69.00, Ti 11.60, Ta 7.03, C 7.87, Co 4.5
Cutting Tools (Roughing, Cast Iron)	TALIDE C-89, Carbide	W 85.90, Ta 2.34, C 5.76, Co 6.0
Cutting Tools (Finishing, Cast Iron)	TALIDE C-91, Carbide	W 87.31, Ta 0.94 C 5.75, Cr 6.0
Cutting Tools (Light Finishing, Cast Iron)	TALIDE C-93, Carbide	W 89.19, Ta 0.94, C 5.87, Co 4.0
Cutting Tools (Precision Boring, Cast Iron)	TALIDE C-95, Carbide	W 89.66, Ta 0.94, C 5.90, Co 3.5
Punching, Shearing	TALIDE C-80, Carbide	W 77.92, C 5.08, Co 17.0
Shock Resisting (Intermittent Impact)	TALIDE C-85, Carbide	W 81.68, C 5.32, Co 13.0
Shock Resisting (Repeated Impact)	TALIDE C-80, Carbide	W 77.92, C 5.08, Co 17.0

A. MILNE & CO., 67 W. 44th St., New York 36, N. Y. — Listing No. 53

Cold Drawing Dies	HIGH PRODUCTION Air Hardening	D2	C 1.55, Cr 11.50, Mo 0.75, V 1.00	Air, Oil Mach. 60 Movement +A
Cold Work Dies (Blanking, Forming)	AMC Oil, Air Hardening, High Speed	T1	Cr 4.00, W 18.00, V 1.00	Oil, Hot Salt, Air Mach. Movement +A 55
Cold Work Dies (Blanking, Forming)	AMCOH Standard Oil Hardening	O1	C 0.95, Mn 1.25, Cr 0.50, W 0.50	Oil Mach. 80 Movement A
Cold Work Dies (Blanking, Forming)	DOUBLE SEVEN Air Hardening	D5	C 1.35, Cr 12.50, Mo 0.60, Co 3.00	Air, Oil Mach. 45 Movement +A
Cold Work Dies (Blanking, Forming)	DOUBLE SIX Air Hardening	D3	C 2.25, Cr 13.00	Oil, Air Mach. 45 Movement +A
Cold Work Dies (Blanking, Forming)	ORANGE LABEL Water Hardening	W1	C 1.00-1.10	Water Mach. 100 Movement C
Cold Work Dies (Blanking, Forming)	(See HIGH PRODUCTION, Listed Above)			
Cold Work Dies (Special Purpose)	AMCOLOY	L6	C 0.75, Mn 0.75, Cr 0.90, Mo 0.25, Ni 1.80	Oil Mach. 85 Movement +B

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Cutting Tools (Finishing)	(See AMC, Listed Above)			
Cutting Tools (Finishing)	MMV Oil, Air Hardening, High Speed	M3	C 1.15, W 6.40, Mo 5.00, V 1.90	Oil, Hot Salt, Air Mach. Movement + A 60
Cutting Tools (Finishing)	MM6&6 Oil, Air Hardening, High Speed	M1	C 0.85, Cr 4.15, W 6.40, Mo 5.00, V 1.90	Oil, Hot Salt Mach. 60 Movement + A
Cutting Tools (Roughing)	MMCO Oil, Air Hardening, High Speed	M36	W 5.80, Mo 5.20, Cr 4.00, V 2.00, Co 9.00	Oil, Hot Salt, Air Mach. Movement + A 50
Cutting Tools (Roughing)	MAJOR Oil, Air Hardening, High Speed	T5	Cr 4.00-5.00, W 21.00-22.00, Mo 0.50, V 1.50, Co 13.00	Oil, Hot Salt, Air Mach. Movement + A 45
Cutting Tools (Roughing)	(See AMC, MMV, MM6&6, Listed Above)			
Diecast Dies (Aluminum)	M 330		C 0.30, Cr 3.00, Mo 3.00, V 0.60	Air Mach. 80 Movement A
Diecast Dies (Aluminum)	M 333		C 0.30, Cr 3.00, Mo 3.00, V 0.60, Co 2.25	Air Mach. 75 Movement A
Diecast Dies (Brass)	(See M 333, Listed Above)			
Diecast (Ejector Pins)	(See M 330, Listed Above)			
Diecast (Ejector Pins)	M 331		C 0.40, Mn 0.55, Si 1.00, Cr 3.30, Mo 2.25, V 0.50	Air Mach. 75 Movement A
Diecasting Dies	AO20 Water, Oil Hardening	S1	C 0.50, Cr 1.50, W 2.25, V 0.25	Oil, Water Mach. 70 Movement B
Diecasting Dies	CMV Air Hardening	H13	C 0.38, Cr 5.25, Mo 1.25, V 1.05, Si 1.00	Air, Oil Mach. 80 Movement + A
Diecasting Dies	CMW Air Hardening	H12	C 0.35, Cr 5.00, W 1.30, Mo 1.75, Si 1.00	Oil, Air Mach. 80 Movement + A
Gages	(See AMCOH, HIGH PRODUCTION, Listed Above)			
High Stress, High Wear Machinery Parts.	(See MSM, Listed Above)			
Hot Work Dies	(See M 333, Listed Above)			
Hot Work Dies (Hot Extrusion)	MX-15 Precipitation Hardening		C 0.50, W 12.00, Cr 4.00, Ni 12.00, V 1.00	
Hot Work Dies (Hot Forming)	(See AMC, AO20, CMW, Listed Above)			
Hot Work Dies (Hot Forming)	3074 HOT WORK Oil, Air Hardening		C 0.35, Cr 4.00, W 8.00-10.00, V 0.50	Oil, Air Mach. 55 Movement A
Hot Work Dies (Hot Forming)	(See M 330, Listed Above)			
Hot Work Dies (Hot Punching, Shearing)	(See AMC, AO20, CMW, 3074 HOT WORK, Listed Above)			
Plastic Molding Dies (Ejector Pins)	MSM Water, Oil Hardening	S5	C 0.55, Mn 0.80, Mo 0.50, V 0.25, Si 2.00	Oil, Water Mach. 80 Movement B
Plastic Molding Dies (Ejector Pins)	(See AO20, Listed Above)			
Plastic Molding Dies (Machined Cavity)	MILBRITE Heat Treated		C 0.50, Mn 1.00, Si 0.30, Cr 1.10, Mo 0.25	
Plastic Molding Dies (Machined Cavity)	MILMOLD Heat Treated	P20	C 0.80, Mn 0.80, Cr 0.80, Mo 0.25, Si 0.50	
Plastic Molding Master Hubs	(See AO20, Listed Above)			
Plastic Molding Dies (Hubs)	(See AMCOH, AO20, HIGH PRODUCTION, MSM, Listed Above)			
Plastic Molding Dies (Machine Cavities)	(See AMCOH, Listed Above)			
Punching & Shearing	MILTUFF Air, Oil Hardening		C 0.50, Cr 3.25, Mo 1.40, Mn 0.70	Air, Oil Mach. 95 Movement A
Punching & Shearing	(See AMCOH, DOUBLE SEVEN, HIGH PRODUCTION, MSM, ORANGE LABEL, Listed Above)			
Shock Resisting (Repeated, Intermittent Impact)	(See AO20, MILTUFF, MSM, ORANGE LABEL, Listed Above)			

NEWCOMER PRODUCTS INC., P. O. Box 272, Latrobe, Pa. — Listing No. 54

Cutting Tools (All Purpose Machining of Cast Iron & Nonferrous Materials)—NEWBIDE ..... N-20, Carbide
Cutting Tools (General Machining, Average Roughing & Finishing of Steels) ..... NS-2, Carbide
Cutting Tools (General Machining, Cast Iron, Nonferrous) .. NC-3, Carbide
Cutting Tools (General Machining of Steel)—NEWBIDE ... N-60, Carbide
Cutting Tools (General Purpose, Cast Iron, Nonferrous)—NEWPRO ..... C-35, Carbide
Cutting Too's (General Purpose Finishing Grade for Steel)—NEWBIDE ..... N-70, Carbide
Cutting Tools (General Purpose, Steel)—NEWPRO ..... S-35, Carbide
Cutting Tools (Heavy Cuts on Steel, Shock Resistant)—NEWBIDE ..... N-50, Carbide
Cutting Tools (Heavy Interrupted Roughing of Steels) .. NS-65, Carbide
Cutting Tools (Heavy Roughing, Cast Iron, Nonferrous) .. NC-5, Carbide
Cutting Tools (High Speed Finishing, Cast Iron, Nonferrous) NC-2, Carbide
Cutting Tools (High Speed Finishing Grade for Steel)—NEWBIDE ..... N-80, Carbide
Cutting Tools (High Velocity Machining)—NEWMET .... NM-93, Carbide
Cutting Tools (High Velocity Machining)—NEWMET .... NM-95, Carbide
Cutting Tools (Milling, General Machining of Steels) ..... NS-3, Carbide
Cutting Tools (Precision Finishing, Boring, Hard Steel) .... NS-17, Carbide
Cutting Tools (Precision Finishing, Tough Steel Alloys) .. NS-15, Carbide
Cutting Tools (Roughing Cuts, Cast Iron, Nonferrous) .... NC-4, Carbide
Cutting Tools (Rough Turning of Forgings, Rolled, Abrasive Steels) ..... NS-4, Carbide
Cutting Tools (Slow Speed, Heavy Feed Roughing of Steels) . NS-6, Carbide

NORTH AMERICAN STEEL CO., 4531 Hough Ave., Cleveland 3, Ohio — Listing No. 55

Brake Dies	SHEFFIELD P. B.		Oil Movement B
Bushings (Cutting Dies)	DEXITE TUBING		Oil Movement A
Cold Work Dies	DEXITE #14		Oil Movement A

★ Last column indicates suggested Quenching Medium; Machinability Annealed, using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Dies	DEXITE AH			Air Movement A
Dies	DEXITE FLAT GROUND STOCK			Oil, Air Movement A
Hand Tools	NASCO			Water Movement B
High Stressed Machine Parts	SHEFFIELD #10			Oil Mach. 80
High Tensile Shafting (Turned, Ground & Polished)	SHEFFIELD #20			
Machined Parts	DEX-TUNG			Water Movement B
Pneumatic Tools	NASCOLOY			Oil, Water Movement B

PENINSULAR STEEL CO., 24401 Groesbeck Highway, P. O. Box 3853, Park Grove Station, Detroit 5, Mich. — Listing No. 56

Coining, Swaging Dies	BROWN LABEL Oil Hardening	S1	C 0.47-0.53, Mn 0.15-0.25, Cr 1.10-1.30, W 2.25-2.75, V 0.15-0.25, Si 0.65-0.85	Oil Mach. 80 Movement +B
Cold Work Dies (Blanking, Forming)	BLUE LABEL Water Hardening	W2	C 1.00-1.10, V 0.15-0.25	Water Mach. 100 Movement —C
Cold Work Dies (Blanking, Cold Forming)	PEN AIR #5 Air Hardening	A2	C 1.00, Mn 0.60, Cr 5.25, Mo 1.10, V 0.25	Air Mach. 65 Movement +A
Cold Work Dies (Blanking, Forming, Coining, Punching, Rolling)	WHITE LABEL Oil, Air Hardening	D2	C 1.40-1.60, Cr 11.00-13.00, Mo 0.70-0.90, V 1.00 max	Air Mach. 75 Movement +A
Cold Work Dies (Forming, Rolling, Blanking)	YELLOW LABEL Oil Hardening	O1	C 0.85-0.95, Mn 1.10-1.25, Cr 0.40-0.60, W 0.40-0.60, V 0.15-0.25, Si 0.20-0.40	Oil Mach. 85 Movement +B
Cold Work Dies (Forming, Draw Rings)	HOLLOBAR (YELLOW LABEL) Oil Hardening	O1	C 0.90, Mn 1.20, V 0.20, Cr 0.50, W 0.50	Oil Mach. 90 Movement +B
Cold Work Dies (Forming, Draw Rings)	HOLLOBAR (WHITE LABEL) Air Hardening	D2	C 1.55, Cr 11.50, Mo 0.80, V 1.00 max	Air Mach. 50 Movement +A
Cold Work Dies (Press Brake Forming)	PENCO BD-30		C 0.51, Mn 0.87, Cr 0.95, Mo 0.20	Prehardened
Cold Work Dies	PENCO 4	A4	C 0.95, Mn 2.00, Cr 1.00, Mo 1.10 (Leaded)	Air Mach. 100 Movement +A
Diecasting Dies	PENCO HI-VAN Air Hardening	H13	C 0.38, Cr 5.25, Mo 1.25, V 1.05	Air Mach. 70 Movement +A
Diecasting Dies	CR-MO-W	H12	C 0.35, Cr 5.15, W 1.55, Mo 1.65, Si 1.05	Air Mach. 70 Movement +A
Hot Work Dies	(See CR-MO-W & PENCO HI-VAN, Listed Above)			
Master Gages, Hobs	(See WHITE LABEL, Listed Above)			
Plastic Mold Master Hobs	(See BROWN LABEL, Listed Above)			
Plastic Molds (Machined Cavities)	LUSTRE DIE		C 0.50, Cr 1.00, Mn 0.90	Prehardened
Plastic Molds (Hubs)	(See YELLOW LABEL, Listed Above)			
Punching, Shearing	SILVER LABEL	S5	C 0.55-0.60, Mn 0.65-0.80, Mo 0.40-0.50, V 0.16-0.25, Si 1.70-2.00	Water, Oil Mach. 100 Movement +B
Punching, Shearing	(See BLUE LABEL, WHITE LABEL, Listed Above)			
Shock Resisting	(See BROWN LABEL, Listed Above)			
Shock Resisting (Tool Shanks)	(See SILVER LABEL, Listed Above)			
Shock Resisting Tools (Repeated Impact)	AIR-SHOCK Air Hardening		C 0.50, Mn 0.70, Cr 3.25, Mo 1.40	Air Mach. 90 Movement +A
Tool Shanks, Wrenches	SAE 6150		C 0.50, Mn 0.90, Cr 1.00, V 0.20	Oil Movement +B

PENNSYLVANIA STEEL CORP., 12270 Coyle Ave., Detroit 27, Mich. — Listing No. 57

Blanking, Forming	L. T. A. Air Hardening		C 1.00, Mn 2.00, Cr 0.90, Mo 0.90	Air Movement A
Cold Work (Dies, etc.)	DYCRO Air Hardening	D2	C 1.55, Cr 11.50, V 0.25, Mo 0.75	Air Movement A
Cold Work (Dies, etc.)	PENN AIR Air Hardening	A2	C 1.00, Mn 0.45, Si 0.40, Cr 5.15, V 0.40, Mo 1.10	Air Movement A
Cold Work (Punches, etc.)	BULL DOG Oil Hardening	S1	C 0.50, Cr 1.20, V 0.25, W 2.50	Oil, Water Movement B
Cutting Tools	PENN-CUT 18-4-1—HSS	T1	C 0.73, Cr 4.00, V 1.00, W 18.00	Air, Oil Movement A-B
Cutting Tools	PENN-CUT-MOLY 6-6-2—HSS	M2	C 0.83, Cr 4.15, V 1.90, W 6.40, Mo 5.00	Air, Oil Movement A-B
Cutting Tools	PENN-CUT-5 18-4-1-5—HSS	T4	C 0.73, Cr 4.00, V 1.00, Mo 0.50, W 18.00, Co 5.00	Air, Oil Movement A-B
Hot Work	NITUNG		C 0.30, Cr 2.75, Mo 0.30, W 9.50, Ni 1.60	Air, Oil Movement A-B
Hot Work	P. H. VAN Air Hardening	H13	C 0.40, Si 1.10, Cr 5.25, V 1.00, Mo 1.25	Air Movement A-B
Hot Work	P.H.W. Air Hardening	H12	C 0.35, Si 1.00, Mo 1.50, Cr 5.00, W 1.25	Air, Oil Movement A
Hot Work	P.H. 9	H21	C 0.35, Cr 2.75, V 0.30, W 9.00	Air, Oil Movement A-B
Hot Work	P.H. 14		C 0.42, Cr 3.50, V 0.30, W 14.00	Air, Oil Movement A-B
Punching, Shearing	SHEAR CUT Water, Oil Hardening	S5	C 0.55, Mn 0.85, Si 2.00, Cr 0.25, V 0.30	Oil, Water Movement B

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Special Purpose Machine Parts	FLEXOR Special Alloy		C 0.34, Mn-Cr-Si-Mo-W-Special	Oil Movement A
Special Tools and Machine Parts	PENN-FLEX Heat Treated Alloy		C 0.33, Mn 0.72, Cr 0.85, Si 0.25, W 0.42, Mo 0.45	Oil Movement A
Tools (Dies, etc.)	TEMPO Oil Hardening	O1	C 0.90, Mn 1.20, Cr 0.50, W 0.50	Oil Movement A

PITTSBURGH TOOL STEEL WIRE CO., Monaca, Pa. — Listing No. 58

Cold Work	BEAVER	D2	C 1.50, Mn 0.30, Cr 12.00, Mo 0.85, V 0.80	Air
Cold Work	DUKANE	W1	C 1.00, Mn 0.25, Si 0.20	Water
Cold Work	MONACA	W1	C 1.20, Mn 0.25, Si 0.20	Water
Cold Work	PITTSBURGH	A2	C 1.00, Mn 0.50, Cr 5.25, Mo 1.10, V 0.25	Air
Cold Work	WARPLIS	O1	C 0.90, Mn 1.10, Si 0.25, Cr 0.50, W 0.50, V 0.15	Oil

H. K. PORTER COMPANY INC., VULCAN-KIDD STEEL DIV., Aliquippa, Pa. — Listing No. 59

Cold Heading Dies	SPECIAL First Quality Carbon	W1	C Various, Mn 0.30, Si 0.25	Brine, Water Mach. 100 Movement —C
Cold Heading Dies	EXTRA High Quality Carbon	W1	C Various, Mn 0.30, Si 0.25	Brine, Water Mach. 100 Movement —C
Cold Heading Dies	FORT PITT Carbon	W1	C Various, Mn 0.30, Si 0.25	Brine, Water Mach. 100 Movement —C
Cold Heading Dies	SPECIAL VANADIUM Carbon-Vanadium	W2	C Various, Mn 0.30, Si 0.25, V 0.30	Brine, Water Mach. 100 Movement —C
Cold Heading Dies (Inserts)	HI-PRO High Carbon, High Chromium	D3	C 2.20, Mn 0.35, Si 0.30, Cr 12.25, V 0.25	Oil, Air Mach. 40 Movement + A
Cold Heading Dies (Inserts)	ALIDIE High Carbon, High Chromium	D2	C 1.55, Mn 0.30, Si 0.30, Cr 12.00, V 0.25, Mo 0.75	Air Mach. 65 Movement + A
Cold Heading Dies (Inserts)	TM-6 High Speed	M2	C 0.83, Mn 0.30, Si 0.30, W 6.40, Cr 4.15, V 1.90, Mo 5.00	Oil, Air, Salt Mach. 70 Movement + A
Cold Heading Dies (Inserts)	CROLOY High Carbon, High Chromium, High Vanadium	D2	C 1.50, Mn 0.35, Si 0.25, Cr 12.00, V 0.95, Mo 0.75	Oil Mach. 65 Movement + A
Cold Heading Dies (Inserts)	WOLFRAM High Speed	T1	C 0.73, Mn 0.30, Si 0.30, W 18.25, Cr 4.00, V 1.10	Oil, Air, Salt Mach. 70 Movement + A
Cold Heading Dies (Press Fit Holders)	AUTO Chromium-Vanadium Alloy	L2	C Various, Mn 0.80, Si 0.25, Cr 1.00, V 0.20	Oil, Water Mach. 85 Movement + B
Cold Heading Dies (Shrink or Press Fit Holders)	TCM Air Hardening Hot Work	H12	C 0.35, Mn 0.40, Si 1.00, W 1.40, Cr 5.00, V 0.25, Mo 1.50	Air Mach. 80 Movement + A
Cold Work Dies (Blanking)	TM-6-FM High Speed	M2-FM	C 0.83, Mn 0.30, Si 0.30, W 6.40, Cr 4.15, V 1.90, Mo 5.00	Oil, Air, Salt Mach. 80 Movement + A
Cold Work Dies (Blanking)	(See WOLFRAM, TM-6, Listed Above)			
Cold Work Dies (Blanking, Forming)	ALIDIE-FM High Carbon, High Chromium	D2-FM	C 1.55, Mn 0.30, Si 0.30, Cr 12.00, V 0.25, Mo 0.75	Air Mach. 75 Movement + A
Cold Work Dies (Blanking, Forming)	OIL-HARD (MANSIL) Oil Hardening	O1	C 0.90, Mn 1.20, Si 0.30, W 0.50, Cr 0.50	Oil Mach. 80 Movement + A
Cold Work Dies (Blanking, Forming)	NICROMAN Oil Hardening Tough	L6 Mod.	C 0.70, Mn 0.45, Ni 1.60, Cr 1.00	Oil Mach. 75 Movement + A
Cold Work Dies (Blanking, Forming)	(See SPECIAL VANADIUM, Listed Above)			
Cold Work Dies (Blanking, Forming)	VAIRLOY Low Temperature, Air Hardening	A4	C 1.00, Mn 2.00, Si 0.30, Cr 0.90, Mo 0.90	Air Mach. 80 Movement + A
Cold Work Dies (Blanking, Forming)	VULDIE 5% Chrome	A2	C 1.00, Mn 0.40, Si 0.30, Cr 5.25, V 0.40, Mo 1.15	Air Mach. 75 Movement + A
Cold Work Dies (Blanking, Forming)	VULDIE-FM	A2-FM	C 1.00, Mn 0.40, Si 0.30, Cr 5.25, V 0.40, Mo 1.15	Air Mach. 85 Movement + A
Cold Work Dies (Blanking, Forming)	(See ALDIE, Listed Above)			
Cold Work Dies (Blanking, Forming)	HARDRITE Tungsten-Chromium	O7	C 1.10, Mn 0.30, Si 0.30, W 1.75, Cr 0.60, V 0.25	Oil Mach. 85 Movement + A
Cold Work Dies (Forming)	K. R. Carbon-Chromium	W5	C 1.10, Mn 0.30, Si 0.25, Cr 0.60	Brine, Water Mach. 100 Movement —C
Cold Work Dies (Striking)	TUSCA Chromium-Molydenum-Vanadium		C 0.50, Mn 0.60, Si 0.30, Cr 1.30, V 0.25, Mo 0.30	Oil Mach. 75 Movement + A
Cold Work Dies (Striking)	VANADIUM STRIKING DIE Carbon-Vanadium	W2	C 0.83, Mn 0.70, Si 0.25, V 0.22	Brine, Water Mach. 85 Movement —C
Cold Work Dies (Striking)	BFW Silicon-Chromium-Vanadium		C 0.45, Mn 0.40, Si 1.50, Cr 1.60, V 0.25	Oil Mach. 70 Movement + A
Cold Work Dies (Striking)	STRIKING DIE Carbon	W1	C 0.90, Mn 0.30, Si 0.25	Brine, Water Mach. 85 Movement —C
Cutting Tools (Broaching)	VUL-MO Molybdenum-Tungsten High Speed	M1	C 0.82, W 1.50, Cr 3.75, V 1.15, Mo 8.75	Oil, Air, Salt Mach. 60 Movement + A
Cutting Tools (Broaching)	VUL-BRO High Carbon, High Vanadium, Molybdenum-Tungsten High Speed	M3	C 1.10, W 6.00, Cr 4.00, V 3.00, Mo 5.00	Oil, Air, Salt Mach. 50 Movement + A
Cutting Tools (Finishing)	SUPER High Speed	T2	C 0.80, Mn 0.30, Si 0.30, W 18.50, Cr 4.25, V 2.15, Mo 0.75	Oil, Air, Salt Mach. 45 Movement + A
Cutting Tools (General Purpose)	(See TM-6, TM-6-FM, Listed Above)			

★ Last column indicates suggested Quenching Medium; Machinability Annealed, using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Cutting Tools (General Purpose)	(See WOLFRAM, Listed Above)			
Cutting Tools (Roughing)	WOLFRAM COBALT High Speed	T4	C 0.72, Mn 0.30, Si 0.30, W 18.25, Cr 4.00, V 1.15, Mo 0.60, Co 5.25	Oil, Air, Salt Mach. 50 Movement + A
Diecasting Dies (Aluminum Base)	(See TCM, Listed Above)			(See Above)
Diecasting Dies (Aluminum Base)	VULCAST Hot Work and Diecasting	H13	C 0.40, Mn 0.40, Si 1.00, Cr 5.00, V 1.00, Mo 1.35	Air Mach. 75 Movement + A
Diecasting Dies (Brass)	A-42 Tungsten-Nickel Hot Work	H21 Mod.	C 0.30, Mn 0.30, Si 0.30, W 9.75, Cr 2.75, Ni 1.65	Oil, Air Mach. 60 Movement + A
Diecasting Dies (Brass)	30 CALO FERRO Tungsten Hot Work	H21	C 0.30, Mn 0.30, Si 0.30, W 9.75, Cr 3.25, V 0.50	Oil, Air Mach. 60 Movement + A
Gages	(See WOLFRAM, TM-6, ALIDIE, VULDIE, VAIRLOY, OIL-HARD, NON-SHRINKABLE, SPECIAL VANADIUM, Listed Above)			
Hot Extrusion Dies (Copper, Brass, Bronze)	(See A-42, 30 CALO FERRO, Listed Above)			
Hot Extrusion Dies (Copper, Brass, Bronze)	TM-6, LOW CARBON Hot Work	H42	C 0.63, Mn 0.30, Si 0.30, W 6.40, Cr 4.15, V 1.90, Mo 5.00	Oil, Air, Salt Mach. 65 Movement + A
Hot Extrusion Dies (Copper, Brass, Bronze)	RMK Chromium Cold Work & Hot Work	H12 Mod.	C 0.52, Mn 0.30, Si 1.10, Cr 5.00, V 1.00, Mo 1.55, Ni 1.50	Air Mach. 75 Movement + A
Hot Extrusion Dies (Aluminum, Magnesium)	(See TCM, VULCAST, Listed Above)			
Hot Extrusion Dies (Copper, Brass, Bronze)	WOLFRAM, LOW CARBON Hot Work	H26	C 0.58, Mn 0.30, Si 0.30, W 18.25, Cr 4.00, V 1.10	Oil, Air, Salt Mach. 60 Movement + A
Hot Work Dies	(See TCM, VULCAST, Listed Above)			
Hot Work Dies	(See WOLFRAM, LOW CARBON; TM-6, LOW CARBON, Listed Above)			
Hot Work Dies	(See 30 CALO FERRO, A-42, Listed Above)			
Hot Work Dies	50 CALO FERRO Tungsten Hot Work	H24	C 0.50, Mn 0.30, Si 0.30, W 14.75, Cr 3.00, V 0.50	Oil, Air Mach. 75 Movement + A
Hot Work Dies	6-HW Chromium Hot Work		C 0.60, Mn 0.30, Si 0.30, Cr 4.00, V 0.75, Mo 0.45	Air Mach. 80 Movement + A
Hot Work Dies	4-HW Chromium Hot Work		C 0.95, Mn 0.30, Si 0.30, Cr 4.00, V 0.75, Mo 0.45	Air Mach. 80 Movement + A
Hot Work Dies	VUL-MAX High Nickel Hot Work		C 0.40, Cr 1.60, V 0.20, Mo 0.85, Ni 4.5	Air Mach. 60 Movement + A
Hot Work Dies	MAGAL Air Hardening Hot Work	H11	C 0.35, Mn 0.35, Si 1.00, Cr 5.00, V 0.45, Mo 1.30	Air Mach. 75 Movement + A
Hot Work Dies (High Toughness)	A-41 Hot Work		C 0.45, Mn 0.70, Si 0.25, Cr 1.60, V 0.25, Mo 1.10	Oil, Air Mach. 85 Movement + B
Machinery Parts (High Stress, Good Wear)	(See AUTO, Listed Above)			
Machinery Parts (High Stress, Good Wear)	SUPERIOR CHROME Tool Steel	L1	C 1.05, Mn 0.35, Si 0.30, Cr 1.40	Oil, Water Mach. 80 Movement + A
Plastic Molding Dies (Hubbed Die Cavities)	PLASTIC DIE Refined Plastic Mold Steel	P1	C 0.08 max	Carburize, Mach. 40 Water Harden Movement + C
Plastic Molding Dies (Hubbed Die Cavities)	VULMOLD Alloy Hubbing	P2	C 0.10 max, Mn 0.70, Si 0.25, Cr 1.40, Mo 0.25, Ni 0.50	Carburize, Mach. 40 Oil Harden Movement + C
Plastic Molding Dies (Hubs)	Q. A. Tungsten-Chromium Shock Resisting	S1	C 0.47, Mn 0.30, Si 0.25, W 2.20, Cr 1.20, V 0.25	Oil, Water Mach. 80 Movement + A
Plastic Molding Dies (Machine Cut Cavity Dies)	(See VAIRLOY, OIL-HARD, NONSHRINKABLE, Listed Above)			
Punching, Shearing	(See ALIDIE, VULDIE, VAIRLOY, OIL-HARD, NONSHRINKABLE, SPECIAL VANADIUM, Q. A., Listed Above)			
Punching, Shearing	HECLA Shock Resisting	L2	C 0.50, Mn 0.60, Si 0.25, W 0.25, Cr 1.00, V 0.25	Oil, Water Mach. 75 Movement + C
Punching, Shearing	HECLA SPECIAL Shock Resisting	L2 Mod.	C 0.65, Mn 0.60, Si 0.25, W 0.25, Cr 1.00, V 0.25	Oil, Water Mach. 75 Movement + C
Punching, Shearing	BLUE EDGE Shock Resisting	S3	C 0.50, Mn 0.30, Si 0.30, W 1.00, Cr 1.00	Oil, Water Mach. 85 Movement + B
Punching, Shearing (Maximum Toughness)	4870 Silico-Manganese Punch & Shear	S4	C 0.55, Mn 0.85, Si 2.00, Cr 0.25, V 0.25	Oil, Water Mach. 85 Movement + B

HORACE T. POTTS CO., E. Erie Avenue & D Street, Philadelphia 34, Pa. — Listing No. 60

Diecasting Dies, Plastic Molding Dies, High Strength Machinery Parts	ELASTUF 44	C 0.50, Bal. Cr, Ni, Mo, Fe	Prehardened (Rc 44) Commercially Machinable
High Strength, Toughness, Machinery Parts	ELASTUF Pb	C 0.50, Bal. Cr, Mo, Fe (leaded)	Prehardened (Rc 30) Commercially Machinable
High Strength, Toughness, Machinery Parts	ELASTUF TYPE A-2	C 0.50, Bal. Cr, Mo, V, Fe	Prehardened (Rc 32) Commercially Machinable

PYRAMID STEEL CO., P. O. Box 1226, Cleveland 3, Ohio — Listing No. 61

Abrasive Plates	MANGO PLATE	Water
Brake Dies	CHROMODI	Oil Movement B
Die (All Types)	PYR-OIL-DIE	Oil Movement A
Dies (All Types)	PYR-AIR-DIE	Air Movement A
Hi-Stress Nonwear Machine Parts	MAINTENAL	Oil Movement A

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Hi-Stress Shafting Heat Treated (Ground Shafting)	SILVALOY			
Hi-Stress Studs Heat Treated	MAINTENAL STUD STOCK			
Shock Resisting	14% MANGANESE MANGO PLATE			Work Hardening Only
Shock Resisting Tools	NU-PYR-LOY			Oil Movement B
Shock Resisting Hand Tools	SU-PYR-LOY			Water Movement A
All Purpose Toolroom	TUNGSITE			Oil & Water Movement B

REDWOOD CORP., 1404 Seventh St. N. W., Canton 3, Ohio — Listing No. 62

Cold Work Dies	FOMAIR	D1	C 0.85, Cr 11.50, Ni 1.00, Mo 0.45, V 0.30	Air, Oil Mach. 50 Movement ±A
Cold Work Dies	PREMIER	D2	C 1.50, Si 0.30, Mn 0.40, Cr 12.00, Mo 0.80, V 0.90	Air Mach. 50 Movement +A
Cold Work Dies	FREEMONT	D3	C 2.00, Cr 12.00, V 1.00	Oil Mach. 45 Movement +A
Cold Work Dies	SPENCER	D4	C 2.25, Si 0.45, Mn 0.42, Cr 12.00, Mo 0.75, V 0.20	Air Mach. 45 Movement +A
Cold Work Dies	KINGSTON	D5	C 1.40, Si 0.60, Mn 0.30, Cr 13.00, Ni 0.50, Mo 0.60, Co 3.30	Air Mach. 50 Movement A
Cold Work Dies	MANCHESTER	D7	C 2.30, Si 0.40, Mn 0.40, Cr 12.50, Mo 1.10, V 4.00	Air Mach. 30 Movement +A
Cold Work Dies	CONCORD	A2	C 1.00, Mn 0.60, Cr 5.25, Mo 1.10, V 0.25	Air Mach. 70 Movement +A
Cold Work Dies	REGENT 4	A4	C 1.00, Si 0.30, Mn 2.00, Cr 0.90, Mo 0.90	Air Mach. 80 Movement +A
Cold Work Dies	REGENT 6	A6	C 0.70, Si 0.30, Mn 2.00, Cr 1.00, Mo 1.35	Air Mach. 80 Movement +A
Cold Work Dies	CONCORD "V"	A7	C 2.40, Si 0.30, Mn 0.70, Cr 5.25, Mo 1.10, V 4.25	Air Mach. 35 Movement +A
Cold Work Dies	JUPITER 95		C 0.95, Si 0.80, Mn 1.55, Cr 1.50	Oil Mach. 85 Movement +A
Cold Work Dies	NEWPORT	O1	C 0.90, Mn 1.20, Cr 0.50, W 0.50, V 0.20	Oil Mach. 90 Movement +B
Cold Work Dies	PRESCOTT	O2	C 0.90, Si 0.25, Mn 1.55, Mo 0.30	Oil Mach. 90 Movement +A
Cold Work Dies	SUPER GRAPH	O6	C 1.45, Si 1.15, Mn 0.80, Cr 0.20, Mo 0.25	Oil Mach. 125 Movement +A
Cold Work Dies	FRANKLIN	O7	C 1.25, Si 0.30, Mn 0.30, Cr 0.40, W 1.40, V 0.20	Oil, Water Mach. 65 Movement +A
Cold Work Dies	CLIFTON	L1	C 1.05, Si 0.30, Mn 0.35, Cr 1.40	Oil, Water Mach. 80 Movement +A
Cold Work Dies	SAXON	L2	C 0.45, Si 0.20, Mn 0.55, Cr 0.95, V 0.20	Oil Mach. 80 Movement +B
Cold Work Dies	MADISON	L6	C 0.75, Mn 0.75, Cr 0.90, Ni 1.80, Mo 0.35	Oil Mach. 85 Movement +B
Cold Work Dies	SAFFORD	L7	C 1.05, Si 0.25, Mn 0.35, Cr 1.20, Mo 0.30	Oil Mach. 80 Movement +B
Cold Work Dies	DORKO (Not Subject to Test)	W1 (Gr 4)	C 1.00, Si 0.25, Mn 0.25	Water Mach. 100 Movement —C
Cold Work Dies	DELTA	W1 (Gr 3)	C 1.00, Si 0.20, Mn 0.35	Water Mach. 100 Movement —C
Cold Work Dies	DELTA EXTRA	W1 (Gr 2)	C 1.00, Si 0.20, Mn 0.35	Water Mach. 100 Movement —C
Cold Work Dies	DELTA SPECIAL	W1 (Gr 1)	C 1.00, Si 0.20, Mn 0.35	Water Mach. 100 Movement —C
Cold Work Dies	MAYNARD (Not Subject to Test)	W2 (Gr 4)	C 1.00, Si 0.25, Mn 0.25	Water Mach. 100 Movement —C
Cold Work Dies	MARINER	W2 (Gr 3)	C 1.00, Si 0.20, Mn 0.35	Water Mach. 100 Movement —C
Cold Work Dies	MARINER EXTRA	W2 (Gr 2)	C 1.00, Si 0.20, Mn 0.35	Water Mach. 100 Movement —C
Cold Work Dies	MARINER SPECIAL	W2 (Gr 1)	C 1.00, Si 0.20, Mn 0.35	Water Mach. 100 Movement —C
Cold Work Dies	PIEDMONT	W4	C 1.10, Si 0.50, Mn 0.30, Cr 0.25	Water Mach. 100 Movement —C
Cold Work Dies	SELBY	W5	C 1.10, Si 0.25, Mn 0.30, Cr 0.60	Water Mach. 100 Movement —C
Cold Work Dies	GARRETT	W7	C 1.00, Si 0.25, Mn 0.30, Cr 0.50, V 0.20	Water Mach. 95 Movement +C
Cutting Tools	KOLBY 2	F2	C 1.30, W 3.50	Water Mach. 70 Movement +C
Cutting Tools	KOLBY 3	F3	C 1.35, Mn 0.35, Cr 0.75, W 3.75	Water Mach. 70 Movement B
Cutting Tools	WOLVERINE M1	M1	C 0.80, Cr 4.00, Mo 8.00, W 1.50, V 1.00	Oil, Air Mach. 55 Movement +A
Cutting Tools	WOLVERINE M2	M2	C 0.80, Si 0.30, Mn 0.25, Cr 4.00, Mo 5.00, W 6.00, V 2.00	Oil, Air Mach. 55 Movement +A
Cutting Tools	WOLVERINE M31	M3 (Type 1)	C 1.05, Cr 4.00, Mo 6.25, W 6.25, V 2.50	Oil, Air Mach. 50 Movement +A
Cutting Tools	WOLVERINE M32	M3 (Type 2)	C 1.15, Cr 4.00, Mo 5.50, W 6.00, V 3.00	Oil, Air Mach. 45 Movement A

★ Last column indicates suggested Quenching Medium; Machinability Annealed, using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Cutting Tools	WOLVERINE M10	M10	C 0.85, Cr 4.00, Mo 8.00, V 2.00	Oil, Air Mach. 55 Movement +A
Cutting Tools	BOLIVAR 1	T1	C 0.70, Si 0.30, Mn 0.25, Cr 4.00, W 18.00, V 1.00	Oil, Air Mach. 50 Movement +A
Cutting Tools	BOLIVAR 2	T2	C 0.80, Cr 4.00, Mo 0.75, W 18.00, V 2.00	Oil, Air Mach. 45 Movement +A
Cutting Tools	BOLIVAR 4	T4	C 0.75, Cr 4.50, W 19.00, V 1.00, Co 5.00	Oil, Air Mach. 45 Movement +A
Cutting Tools	BOLIVAR 8	T8	C 0.80, Si 0.30, Mn 0.30, Cr 4.00, Mo 0.75, W 14.00, V 2.00, Co 5.75	Oil, Air Mach. 45 Movement +A
Cutting Tools	BOLIVAR 15	T15	C 1.50, Si 0.25, Mn 0.25, Cr 4.50, W 12.50, V 5.00, Co 5.00	Oil Mach. 25 Movement A
High Stress & High Wear Machinery Parts	BRISTOL		C 0.50, Si 0.30, Mn 0.90, Cr 0.90, Mo 0.20	Oil Mach. 110 Movement +B
Hot Work Dies	REDSTONE 11	H11	C 0.40, Si 0.90, Mn 0.30, Cr 5.00, Mo 1.30, V 0.50	Oil, Air Mach. 70 Movement A
Hot Work Dies	REDSTONE 12	H12	C 0.33, Si 0.85, Cr 5.00, Mo 1.45, W 1.25, V 0.20	Oil, Air Mach. 70 Movement A
Hot Work Dies	REDSTONE 13	H13	C 0.40, Si 1.00, Cr 5.00, Mo 1.00, V 1.00	Oil, Air Mach. 70 Movement —A
Hot Work Dies	REDSTONE 21	H21	C 0.30, Cr 3.00, W 9.50, V 0.50	Oil, Air Mach. 70 Movement A
Hot Work Dies	REDSTONE 23	H23	C 0.30, Si 0.50, Mn 0.35, Cr 12.00, W 12.00, V 1.00	Oil Mach. 55 Movement A
Hot Work Dies	REDSTONE 26	H26	C 0.60, Si 0.30, Mn 0.30, Cr 4.00, W 18.00, V 1.00	Oil, Air Mach. 60 Movement +A
Hot Work Dies	REDSTONE 42	H42	C 0.65, Si 0.30, Mn 0.30, Cr 4.00, Mo 5.00, W 6.50, V 2.00	Oil, Air Mach. 65 Movement +A
Plastic Mold Dies	BALTIC 1	P1	C 0.08 (max)	Carburize, Water Mach. 40 Movement +C
Plastic Mold Dies	BALTIC 2	P2	C 0.06, Si 0.15, Mn 0.30, Cr 0.95, Mo 0.25, Co (Boron Added)	Oil Mach. 50 Movement +B
Plastic Mold Dies	BALTIC 4	P4	C 0.07, Si 0.20, Mn 0.35, Cr 4.50, Mo 0.50	Air Mach. 60 Movement +A
Shock Resisting	BENGAL	S1	C 0.50, Si 0.75, Cr 1.15, W 2.50, V 0.20	Oil Mach. 75 Movement +B
Shock Resisting	KIMBALL	S3	C 0.50, Si 0.30, Mn 0.30, Cr 1.00, W 1.00	Oil, Water Mach. 85 Movement +B
Shock Resisting	BALLARD	S4	C 0.60, Si 2.00, Mn 0.90	Oil, Water Mach. 65 Movement ±B
Shock Resisting	RHINO	S5	C 0.60, Si 1.85, Mn 0.70, Mo 0.45, V 0.20	Oil, Water Mach. 65 Movement ±B

REPUBLIC STEEL CORP., 1441 Republic Bldg., Cleveland 1, Ohio — Listing No. 63

Cold Work (Forming)	C-C Water Hardening	W5	C 1.10, Mn 0.30, Cr 0.60	Water Mach. 85 Movement —B
Cold Work (Forming)	UA-8 Water Hardening	L7	C 1.00, Mn 0.35, Cr 1.35, Mo 0.35	Water, Oil Mach. 80 Movement B
Cold Work (Hubs)	C-V Oil Hardening	S1	C 0.50, Mn 0.30, Cr 1.20, W 2.20, V 0.25	Water, Oil Mach. 85 Movement +B
Cold Work (Punching, Shearing, Forming)	DUMOST #1 Water Hardening	W2	C 0.85, Mn 0.30, V 0.30	Water Mach. 90 Movement —B
Cold Work (Punching, Shearing, Forming)	DUMOST #2 Water Hardening	W2	C 0.95, Mn 0.30, V 0.30	Water Mach. 90 Movement —B
Cold Work (Punching, Shearing, Forming)	EXTRA CARBON Water Hardening	W1	C 0.65-1.40, Mn 0.30, Si 0.15-0.30	Water Mach. 100 Movement —B
Cold Work (Punching, Shearing, Forming)	SPECIAL CARBON Water Hardening	W1	C 0.65-1.40, Mn 0.30, Si 0.15-0.30	Water Mach. 100 Movement —B
Cold Work (Punching, Shearing, Forming)	STANDARD CARBON Water Hardening	W1	C 0.65-1.00, Mn 0.30, Si 0.15-0.30	Water Mach. 100 Movement —B
Cold Work (Forming, Shearing)	UA-6 Oil Hardening		C 0.65, Mn 0.60, Cr 1.00, W 0.25, V 0.25	Oil, Water Mach. 75 Movement —B
Cold Work Dies (Blanking, Forming)	DUMOST #3 Water Hardening	W2	C 1.10, Mn 0.30, V 0.30	Water Mach. 85 Movement —B
Cold Work Dies (Blanking, Forming, Shearing)	AIRALOY Air Hardening	A4	C 1.00, Mn 2.00, Cr 0.90, Mo 0.90	Air Mach. 65 Movement +A
Cold Work Dies (Blanking, Forming, Shearing)	ARRESTITE Oil Hardening	O2	C 0.90, Mn 1.50, Cr 0.20	Oil Mach.90 Movement A
Cold Work Dies (Blanking, Forming, Shearing)	H-C	D3	C 2.20, Mn 0.35, Si 0.30, Cr 12.25	Oil Mach. 40
Cold Work Dies (Blanking, Forming, Shearing)	KROMAIR	A2	C 1.00, Cr 5.25, Mo 1.15, V 0.25	Air Movement A
Cold Work Dies (Blanking, Forming, Shearing)	SPECIAL OIL HARDENING Oil Hardening	O1	C 0.90, Mn 1.20, Cr 0.50, W 0.50	Oil Mach. 90 Movement +A
Cold Work Dies (Blanking, Forming, Shearing)	404 Air Hardening	D2	C 1.55, Cr 12.00, Mo 0.75, V 0.25	Air, Oil Mach. 50 Movement +A
Cutting Tools (Finishing)	FAST FINISHING Water Hardening	F2	C 1.35, W 3.50	Water Mach. 65 Movement —C
Cutting Tools (Roughing)	B-F HIGH SPEED High Speed	T1	C 0.72, Mn 0.30, Cr 4.00, W 18.00, V 1.00	Oil, Air Mach. 50 Movement +A
Cutting Tools (Roughing)	COBALT HIGH SPEED High Speed	T4	C 0.72, Mn 0.30, Cr 4.00, W 18.00, Mo 0.50, V 1.00, Co 5.00	Oil, Air Mach. 45 Movement +A
Cutting Tools (Roughing)	SPECIAL M-O High Speed	M2	C 0.82, Mn 0.30, Cr 4.15, W 6.40, Mo 5.00, V 1.90	Oil, Air Mach. 55 Movement +A
Cutting Tools (Roughing, Finishing)	IXL High Speed	T2	C 0.80, Mn 0.30, Cr 4.00, W 19.00, Mo 0.75, V 2.00	Oil, Air Mach. 45 Movement +A

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Diecasting Dies (Brass)	RESCO Air Hardening		C 0.30, Cr 2.75, W 9.50, Mo 0.25, Ni 1.75	Air, Oil Mach. 70 Movement + B
Diecasting Dies (Aluminum)	V-HW Air Hardening	H13	C 0.40, Cr 5.00, Mo 1.25, V 1.00, Si 1.00	Air Movement A
Hot Work (Forming, Shearing)	6-H-W Air Hardening		C 0.60, Cr 4.00, Mo 0.45, V 0.75	Air, Oil Mach. 75 Movement + B
Hot Work Dies (Forming, Punching)	10-H-W Air Hardening	H12	C 0.35, Cr 5.00, W 1.25, Mo 1.50, Si 1.00, V 0.25	Air, Oil Mach. 70 Movement B
Hot Work (Hot Forming)	XX-SUPERIOR Air Hardening		C 0.90, Cr 4.00, Mo 0.45, V 0.75	Air, Oil Mach. 75 Movement + B
Hot Work (Punching, Forming)	AIR HARDENING #30 Air Hardening	H21	C 0.30, Cr 3.50, W 9.00, V 0.50	Air, Oil Mach. 70 Movement + B
Hot Work (Punching, Shearing, Forming)	AIR HARDENING #40 Air Hardening	H24	C 0.50, Cr 3.00, W 15.00, V 0.50	Air, Oil Mach. 65 Movement — B
Hot Work (Punches, Dies)	(See C-V, Listed Above)			
Hot Work (Punching, Forming)	(See RESCO, Listed Above)			
Hot Work Dies (Punching, Shearing, Forming)	12-HW		C 0.52, Mn 0.30, Si 1.10, Cu 5.00, V 1.00, Mo 1.55, Ni 1.50	Air Mach. 70
Hot Work (Punching, Forming)	550 Oil Hardening		C 0.45, Mn 0.65, Cr 1.60, Mo 1.10, V 0.25	Oil Mach. 80 Movement + B
Plastic Mold Dies (Hubbed Cavities)	PLASTIC DIE Water Hardening	P1	C 0.08 max, Mn 0.10 max	
Shock Resisting (Intermittent Impact)	UA-4 Oil Hardening		C 0.50, Mn 0.60, Cr 1.00, W 0.25, V 0.25	Oil, Water Mach. 80
Shock Resisting (Repeated Impact)	M-TUNGSTEN Oil Hardening	S3	C 0.50, Mn 0.35, Cr 1.00, W 1.00	Oil, Water Mach. 80 Movement B
Shock Resisting (Repeated Impact)	SPECIAL AUTO-A Oil Hardening		C 0.30, Mn 0.65, Cr 0.90, V 0.20	Oil, Water Mach. 80
Shock Resisting (Repeated Impact)	SPECIAL AUTO-D Oil Hardening		C 0.50, Mn 0.65, Cr 0.90, V 0.20	Oil, Water Mach. 80
Shock Resisting (Repeated Impact)	SPECIAL PUNCH Water Hardening	S4	C 0.55, Mn 0.85, Cr 0.30, V 0.30, Si 2.00	Water, Oil Mach. 80 Movement — B

JOS. T. RYERSON & SON INC., P.O. Box 8000-A, Chicago 80, Ill. — Listing No. 64

Chisels—Drills	V.D. CHISEL STEEL Water Hardening		C 0.77, Mn 0.35, Mo 0.18, Si 0.23	Water
Cold Work Dies (Blanking & Forming)	RY-ALLOY Oil Hardening	O2	C 0.95, Mn 1.60, Mo 0.25, Si 0.25	Oil Mach. 90 Movement A
Cold Work Dies (Blanking & Forming)	RY-ALLOY FLAT Ground Stock	O1	C 0.90, Mn 1.20, Si 0.30, Cr 0.50, W 0.50	Oil Mach. 90 Movement A
Cold Work Dies (Blanking & Forming)	V.D. Water Hardening	W2	C 1.00, Mn 0.23, V 0.18, Si 0.25	Water Mach. 95 Movement C
Cutting Tools	(See V.D., RY-ALLOY, Listed Above)			
Diecasting Dies	NITRALLOY 135 MOD. Heat Treated		C 0.40, Mn 0.60, Mo 0.35, Cr 1.70, Al 1.20, Si 0.35	Mach. 125
Gages	(See V.D., RY-ALLOY, RY-ALLOY FLAT, Listed Above)			
High Stress, High Wear Machinery Parts	NEW RYCUT 50 HEAT TREATED		C 0.38-0.53, Bal. Cr, Mo, Fe, Leaded	Mach. Annld. 215 H.T. 165
High Stress, High Wear Machinery Parts	RYCROME Heat Treated		C 0.40, Bal. Cr, Mo, Fe	Mach. H.T. 137
High Wear Machinery Parts	RYCUT 20		C 0.20, Bal. Ni, Cr, Mo, Fe, Leaded	Mach. 225
High Stress, High Wear Machinery Parts	(See NITRALLOY 135 MOD., Listed Above)			
Plastic Forming Dies	(See RY-ALLOY, Listed Above)			
Plastic Molding Dies (Ejector Pins)	RY-ALLOY DRILL Rod	O2	C 0.95, Mn 1.60, Mo 0.25, Si 0.25	Oil Mach. 90 Movement A
Plastic Molding Dies (Ejector Pins)	RYERSON CARBON Drill Rod		C 1.00	Water Mach. 100 Movement B
Press Brake Dies	RYCUT HEAT TREATED		C 0.50, Bal. Cr, Mo, S, Fe	Mach. Annld. 175 H.T. 150
Punching & Shearing	(See V.D., RY-ALLOY, Listed Above)			

SANDVIK STEEL INC., 1702 Nevins Rd., Fair Lawn, N. J. — Listing No. 65

Cutting Tools (Precision Finishing & Boring of Steel)	COROMANT F1, Carbide
Cutting Tools (Semifinishing & Finishing of Steel)	COROMANT S1P, Carbide
Cutting Tools (Profiling & General Purpose of Machining Steel)	COROMANT S2, Carbide
Cutting Tools (Semiroughing & Finish Machining of Steel)	COROMANT S4, Carbide
Cutting Tools (Extra Rough Machining of Steel)	COROMANT S6, Carbide
Cutting Tools (Extreme Finishing of Cast Iron, Heavy Alloys & Nonmetallics)	COROMANT HO5, Carbide
Cutting Tools (Semifinishing & Roughing of Cast Iron & Nonmetallics)	COROMANT H13, Carbide
Cutting Tools (Machining of Cast Iron, Light Alloys, Alloys, Plastics, etc.)	COROMANT H20, Carbide
Cutting Tools (Rough Machining of Cast Iron & High Manganese)	COROMANT SH, Carbide

★ Last column indicates suggested Quenching Medium; Machinability Annealed, using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.

SEABOARD STEEL CO. OF AMERICA INC., 1775 Broadway, New York 19, N. Y. — Listing No. 66

Cold Work (Blanking)	SECOLEO			Oil Movement A
Cold Work (Blanking)	SECAERO			Air Movement A
Cutting Tools (Roughing)	SECOBALT (High Speed)			Movement B
Cutting Tools (Finishing)	SECOVAN (High Speed)			Movement B
High Tensile Alloy Steel (Torsional Strains & Stresses)	SEABOARD SPECIAL RED LABEL			
Punching & Shearing (Shock Resisting)	PROGEN			

SIMONDS SAW & STEEL CO., Ohio Street, Lockport, N. Y. — Listing No. 67

Cold Work Dies	SIMONDS O.H.D. #106		C 1.20, Mn 0.35, Si 0.25, Cr 0.60, W 1.50, V 0.20	
Cold Work Dies	C.C.M. Air Hardening	D2	C 1.55, Mn 0.25, Cr 12.00, Mo 0.80, V 0.35, Si 0.35	Air Movement A
Cold Work Dies	SIMONDS AIRTRUE Air Hardening	A2	C 1.00, Mn 0.65, Si 0.25, Cr 5.25, Mo 1.00, V 0.30	Air
Cold Work Dies	SIMONDS 864 Oil Hardening	O2	C 0.90, Mn 1.50, Mo 0.25	Oil Movement A
Cold Work Dies	S-12225 Oil Hardening	D3	C 2.00, Mn 0.35, Si 0.50, Cr 12.00	Oil Movement A
Cold Work Dies	TEENAX No. 46 Oil Hardening	O1	C 0.90, Mn 1.25, Cr 0.50, W 0.50, V 0.20, Si 0.20	Oil Movement A
Cutting Tools	BLUE LABEL EXTRA Water Hardening	W1	C as Desired, P 0.02 max, S 0.02, max, V optional	Water
Cutting Tools	DIAMOND S Water Hardening	W1	C as Desired, P 0.025 max, S. 0.025 max, V optional	Water
Cutting Tools	GREEN LABEL Water Hardening	W1	C as Desired, P 0.03 max, S 0.03 max, Mn 0.25, Si 0.25, V Optional	
Cutting Tools	RED LABEL SPECIAL Water Hardening	W1	C as Desired, P 0.015 max, S 0.015 max, Mn 0.25, Si 0.25, V Optional	
Cutting Tools	LOCKPORT SPECIAL High Speed	T2	C 0.80, Cr 4.25, W 18.50, Mo 0.70, V 2.25	
Cutting Tools	MOLVA-T High Speed	M2	C 0.80, Cr 4.00, W 5.75, Mo 4.50, V 1.60	
Cutting Tools	MOLVA High Speed	M10	C 0.85, Cr 3.85, Mo 7.50, V 1.85	
Cutting Tools	RED STREAK High Speed	T1	C 0.72, Cr 4.00, W 18.00, V 1.00	
Cutting Tools	S.T.M. High Speed	M1	C 0.80, Cr 3.75, W 1.50, Mo 8.75, V 1.25	
Cutting Tools	SUPER COBALT High Speed	T5	C 0.80, Cr 4.00, W 18.00, V 2.00, Co 8.00	
Cutting Tools	TUNCO High Speed	T4	C 0.75, Cr 4.00, W 18.00, V 1.00, Co 5.00	
Hot Work Dies	D.N.V. HOT WORK Oil, Air Hardening	H21	C 0.32, Mn 0.30, Cr 3.25, W 9.50, V 0.40, Si 0.35	Air, Oil
Shock Resisting	COMMANDO 47 Oil Hardening	S1	C 0.47, Mn 0.25, Cr 1.40, W 2.00, Mo 0.25, V 0.25, Si 0.80	Oil
Shock Resisting	HAVOC Water, Oil Hardening	S2	C 0.50, Mn 0.40, Mo 0.50, V 0.20, Si 1.00	Water
Shock Resisting	ORLEANS Water, Oil Hardening	S5	C 0.53, Mn 0.80, Cr 0.25, Mo 0.35, V 0.20, Si 1.95	Oil, Water Movement —C

L. S. STARRETT CO., 101 Crescent St., Athol, Mass. — Listing No. 68

High Production Cold Work Dies	STARRETT PRECISION GROUND DIE STOCK Air Hardening	A2	C 1.00, Mn 0.60, Cr 5.25, Mo 1.00, V 0.25, Si 0.40	Air Mach. 75 Movement +A
Knives, Templates, Dies	STARRETT PRECISION GROUND DIE STOCK Water Hardening	W5	C 1.15, Mn 1.25, Cr 0.50, Si 0.25	Water, Brine Mach. 100 Movement —C
Stamps, Punches, Dies	STARRETT PRECISION GROUND DIE STOCK Oil Hardening	O1	C 0.90, Mn 1.25, Cr 0.50, W 0.50, Si 0.25	Oil Mach. 90 Movement +B

TIMKEN ROLLER BEARING CO., 1835 Dueber Ave. S.W., Canton 6, Ohio — Listing No. 69

Bushings (Drill Jig & Die Set, High Wear Resistance)	GRAPH-MO Oil Hardening	O6	C 1.45 avg, Mn 1.00 max, Mo 0.25 avg, Si 0.90 avg	Oil Mach. 135 Movement A
Cold Work Dies (Bars, Tubes Drawing, Draw Dies, Stainless)	GRAPH-TUNG Water Hardening		C 1.50 avg, Mn 0.50 max, W 2.80 avg, Mo 0.50 avg, Si 0.65 avg	Oil or Brine Mach. 85 Water Mach. 100 Movement B
Cold Work Dies (Blanking, Lamination, Notching & Trimming)	GRAPH-AIR Air Hardening		C 1.35, Mn 1.85, P 0.025 max, S 0.025 max, Si 1.20, Ni 1.85, Mo 1.50	Air Mach. 90 Movement +A

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Cold Work Dies ..... (See GRAPH-MO, Listed Above)				
(Gibs, Wear Plates, Straightener & Leveller Rolls, Stainless Strip Forming Rolls, Flanging Sections, Commercial Piston Rings, Master & Machine Cams, Wear-Resistant Die Inserts, Machine Tool Parts, Brick Mold Liners & Platen Plates)				
Cutoff Bushing ..... (See GRAPH-TUNG, Listed Above)				
Dies ..... (Bars, Tube Drawing, etc.)	GRAPH-AL ..... Water Hardening		C 1.50 avg. Mn 0.30 max, Si 0.15-0.25, Al 0.12-0.20	Water or Brine Mach. 100 Movement B
Dies ..... (Blanking, Cold Forming, etc.)	(See GRAPH-AIR, Listed Above)			
Draw Dies ..... (Deep Draw, Carbon & Stainless)	(See GRAPH-MO, Listed Above)			
Gages (Master, Thread, Ring & Plug, Gage Blocks, & Surface Plates)	(See GRAPH-MO, Listed Above)			
General Purpose (Standard Toolroom Oil Hardening)	(See GRAPH-MO, Listed Above)			
High Stress & High Wear Machining Parts (Collets & Feed Fingers, Arbors, Drill Bushings, Cams, Cam Rolls & Spindles)	(See GRAPH-MO, Listed Above)			
Lathe Centers	(See GRAPH-TUNG, Listed Above)			
Plastic Molding Dies ..... (Machine Cut Cavity Dies)	(See GRAPH-AIR, Listed Above)			
Punches ..... (Blanking, Forming, Piercing, etc.)	(See GRAPH-MO, Listed Above)			
Tube Drawing Mandrels	(See GRAPH-AL, Listed Above)			

TUNGSTEN ALLOY MFG. CO. INC., 306 Sussex St., Harrison, N. J. — Listing No. 70

Cutting Tools (Chip Removal, Cast Irons, Nonferrous Metals & Nonmetallic Materials, Roughing) ..... 9, Carbide
Cutting Tools (Chip Removal, Cast Irons, Nonferrous Metals & Nonmetallic Materials, General Purpose) ..... 9H, Carbide
Cutting Tools (Chip Removal, Cast Irons, Nonferrous Metals & Nonmetallic Materials, Light Finishing) ..... 9C, Carbide
Cutting Tools (Chip Removal, Cast Irons, Nonferrous Metals & Nonmetallic Materials, Fine Finishing & Precision Boring) ..... 9B, Carbide
Cutting Tools (Chip Removal, Steel, Roughing) ..... 11T, Carbide
Cutting Tools (Chip Removal, Steel, General Purpose) ..... 10T, Carbide
Cutting Tools (Chip Removal, Steel, Semifinishing) ..... 9T, Carbide
Cutting Tools (Chip Removal, Steel, Finishing) ..... 8T, Carbide
Cutting Tools (Chip Removal, Steel, Fine Finishing & Precision Boring) ..... 5S, Carbide
Cutting Tools (Chip Removal, Steel, Heavy Duty Machining) 9S, Carbide
Cutting Tools (Chip Removal, Steel, General Purpose Machining on Old & Not-Too Rigid Equipment) ..... 9K, Carbide
Cutting Tools (Chip Removal, Alloy Cast Irons, Special Machining When Cratering Is Factor) ..... 5H, Carbide
Cutting Tools (Chip Removal, Alloy Cast Irons & Light Metals, Special Machining When Cratering Is Factor) ..... 6H, Carbide
Cutting Tools (Chip Removal, Cast Irons & Semisteels, High Speed Planing When Cratering Is Factor) ..... 8H, Carbide
Cutting Tools (Chip Removal, Steel, Planing When Cratering Is Factor) ..... 11H, Carbide
Cutting Tools (Chip Removal, Steel, Shaping, Planing & Shock Applications When Cratering Is Factor) ..... 12H, Carbide
Cutting Tools (Chip Removal, Steel, Extremely Heavy Roughing When Cratering Is Factor, Removal of Hot Flash Welds, Machining Uranium) ..... 13H, Carbide
Cutting Tools (Chip Removal, Steel, Machining Hot Flash Steel Welds) ..... 16G, Carbide
Wear Resistant Applications (No Shock) ..... 9, 9H, Carbide
Wear Resistant Applications (Light Shock) ..... 9M, 9, Carbide
Wear Resistant Applications (Heavy Shock) ..... 9A15, 9A, Carbide
Wear Resistant Applications (Heat Resistant, Guides & Gage Blocks) ..... 8H, Carbide
Impact Applications (Light Impact) ..... 9M, 9, Carbide
Impact Applications (Light to Medium Impact) ..... 11C, Carbide
Impact Applications (Medium Impact) ..... 9A15, 9A, Carbide
Impact Applications (Medium to Heavy Impact) ..... 15C, Carbide
Impact Applications (Heavy Impact) ..... 9A25, 9A20, Carbide
Impact Applications (Very Heavy Impact) ..... 9A30, Carbide
Impact Applications (Heavy Impact, Nongalling) ..... 20H, Carbide
Impact Applications (Very Heavy Impact, Nongalling) ..... 25H, Carbide
Impact Applications (Extra Heavy Impact, Nongalling) ..... 30H, Carbide
Mining & Rock Drilling Applications ..... 11C, 12C, Carbide
Special Percussion Applications ..... 15C, Carbide

UDDEHOLM CO. OF AMERICA INC., 155 E. 44th St., New York 17, N. Y. — Listing No. 71

Cold Work Dies (Blanking, Cold Forming)	UHB WATER ..... Water Hardening	W1	C 1.05, Mn 0.30, Si 0.25	Water Mach. 100 Movement C
Cold Work Dies (Blanking, Cold Forming)	UHB EXTRA ..... Water Hardening	W1	C 1.05, Mn 0.30, Si 0.25	Water Mach. 100 Movement C
Cold Work Dies (Blanking, Cold Forming)	UHB-VA ..... Water Hardening	W2	C 1.05, Mn 0.30, Si 0.25, V 0.20	Water Mach. 100 Movement C
Cold Work Dies (Blanking, Cold Forming, Coining, Swaging)	UHB-711 ..... Oil Hardening	S1	C 0.50, Mn 0.25, Si 0.75, Cr 1.25, W 2.50, V 0.20	Oil Mach. 75 Movement + B
Cold Work Dies (Blanking, Stamping, Cold Forming)	UHB-46 ..... Oil Hardening	O1	C 0.90, Mn 1.20, Si 0.35, Cr 0.50, W 0.50, V 0.15	Oil Mach. 90 Movement + A
Cold Work Dies (Blanking, Stamping, Trimming, Cold Forming)	UHB-151 ..... Air Hardening	A2	C 1.00, Mn 0.60, Si 0.25, Cr 5.25, Mo 1.10, V 0.20	Air Mach. 65 Movement + A
Cold Work Dies (Blanking, Stamping, Lamination, Extruding, Thread & Form Rolling, Cold Forming, Powder Compression)	TRIMO ..... Air Hardening	D2	C 1.50 Mn 0.45, Si 0.30, Cr 12.00, Mo 0.80, V 0.25	Air Mach. 45 Movement + A
Cold Work Dies (Blanking, Stamping, Lamination, Extruding, Cold Forming, Powder Compression)	TRIVAN ..... Oil Hardening	D3	C 2.05, Mn 0.75, Si 0.30, Cr 13.00, W 1.25	Oil Mach. 40 Movement + A
Cold Work Dies (Blanking, Stamping, Lamination, Extruding, Cold Forming, Powder Compression)	TRI-TUNG ..... Air or Oil Hardening	D6	C 2.05, Mn 0.75, Si 0.30, Cr 13.00, W 1.25	Air or Oil Mach. 40 Movement + A
Cold Work Dies (Heading)	UHB-19VA ..... Water Hardening	W2	C 0.92, Mn 0.30, Si 0.25, V 0.10	Water Mach. 100 Movement C
Diecasting Dies	UHB SPECIAL ..... Air Hardening	H12	C 0.35, Mn 0.40, Si 1.05, Cr 5.00, W 1.50, Mo 1.65	Air Mach. 70 Movement + A

★ Last column indicates suggested Quenching Medium; Machinability Annealed, using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Diecasting Dies	UHB ORVAR Air Hardening	H13	C 0.38, Mn 0.35, Si 1.00, Cr 5.25, Mo 1.35, V 1.00	Air Mach. 70 Movement A
Gages	(See UHB-46, UHB-151, TRIMO, TRIVAN, Listed Above)			
Hot Work Dies (Diecasting Dies, Extrusion Dies, Forging Dies for High Temperature Alloys, Dummy Blocks)	UHB CALDUR Air or Oil Hardening		C 0.25, Cr 12.00, W 7.00, Co 4.00	Air Mach. 45 Movement +A
Hot Work Dies (Diecasting Dies, Extrusion Dies, Forging Dies for High Temperature Alloys)	UHB CALMAX Air or Oil Hardening		C 0.28, Cr 12.00, W 7.00, Co 9.00, V 0.40	Air Mach. 45 Movement +A
Hot Work Dies (Forging Die Inserts, Hot Swaging Dies)	(See UHB-711, Listed Above)			
Hot Work Dies (Hot Forming, Hot Punching & Shearing)	(See UHB ORVAR, UHB SPECIAL, Listed Above)			
Plastic Molding Dies (Hubbed Cavity Dies)	UHB FORMA Water Hardening	P1	C 0.05 max, Mn 0.10 max, Si 0.10 max	Water Movement C
Plastic Molding Dies (Hubbed Cavity Dies)	UHB PREMO Oil or Air Hardening	P4	C 0.06, Mn 0.10, Si 0.10, Cr 3.90, Mo 0.50	Oil or Air Movement A
Plastic Molding Dies (Machine Cut Cavity Dies)	(See UHB-46, Listed Above)			
Plastic Molding Dies (Hubs)	(See UHB-711, TRIMO, Listed Above)			
Punching & Shearing	(See UHB-711, Listed Above)			
Shock Resisting	UHB RESISTO Oil or Water Hardening	S5	C 0.60, Mn 0.70, Si 1.85, Mo 0.45, V 0.20	Oil or Water Mach. 65 Movement ±B
Shock Resisting	(See UHB-711, Listed Above)			

UNIVERSAL ALLOY STEEL CO., P. O. Box 705, Cleveland 22, Ohio — Listing No. 72

Abrasion Resistant Plates	UNALLOY WEARPLATE WP3, WP4, WP5		Cr, Si, Mn	Water
High Tensile Abrasion (Resistant Heat Treated Shafting)	UNALLOY SHAFTING			
High Stress Studs (Heat Treated)	UNALLOY STUD STOCK			
Machined Parts	UNALLOY			Water Movement B
Hand Tools, Shock Resisting (Intermittent Impact)	UNALLOY			Water Movement B
Pneumatic Tools, Shock Resisting (Repeated Impact)	UNALLOY TOOLS Unarammers			Oil, Water Movement B
Shock Resisting Tools (Pneumatic Hand Tools)	UNALLOY CHROM-TUNG Oil Hardening	S1	C 0.50-0.55, Cr 1.25, W 2.50, V 0.20, Si 0.75	Oil Mach. 80 Movement +B

UNIVERSAL-CYCLOPS STEEL CORP., Bridgeville, Pa. — Listing No. 73

Cold Work Dies (Blanking, Forming)	ALCO M Oil Hardening	S1	C 0.50, Mn 0.25, Si 0.25, Cr 1.50, W 2.25, V 0.25, Mo 0.30	Oil Mach. 85 Movement +B
Cold Work Dies (Blanking, Forming)	ALLOY B Water Hardening	L1	C 1.00, Mn 0.35, Si 0.25, Cr 1.35	Water Mach. 95 Movement +C
Cold Work Dies (Blanking, Forming)	CYCLOPS SPECIAL Water Hardening	W1	C 1.00, Mn 0.25, Si 0.25	Water Mach. 100 Movement +C
Cold Work Dies (Blanking, Forming)	CYCLOPS STANDARD Water Hardening	W1	C 1.00, Mn 0.25, Si 0.25	Water Mach. 100 Movement +C
Cold Work Dies (Blanking, Forming)	DRACO DV Water Hardening	W2	C 1.00, Mn 0.25, Si 0.25, V 0.50	Water Mach. 100 Movement +C
Cold Work Dies (Blanking, Forming)	DRACO SPECIAL Water Hardening	W2	C 1.00, Mn 0.25, Si 0.25, V 0.25	Water Mach. 100 Movement +C
Cold Work Dies (Blanking, Forming)	DRACO STANDARD Water Hardening	W2	C 1.00, Mn 0.25, Si 0.25, V 0.25	Water Mach. 100 Movement +C
Cold Work Dies (Blanking, Forming)	EK-81 Air Hardening	D5	C 1.35, Mn 0.30, Si 0.25, Cr 12.75, Mo 0.80, Co 3.00	Air Mach. 50 Movement +A
Cold Work Dies (Blanking, Forming)	HERCULES Water Hardening	W7	C 1.00, Mn 0.30, Si 0.25, Cr 0.50, V 0.20	Water Mach. 95 Movement +C
Cold Work Dies (Blanking, Forming)	LO-AIR Air Hardening	A6	C 0.70, Mn 2.00, Cr 1.00, Mo 1.35, Si 0.30	Air Mach. 100 Movement +A
Cold Work Dies (Blanking, Forming)	MOTUNG P&D Oil or Salt	M1	C 0.75, Mn 0.30, Si 0.30, Cr 4.00, W 1.50, V 1.15, Mo 8.50	Oil or Salt Mach. 60 Movement +B
Cold Work Dies (Blanking, Forming)	N-9 Oil Hardening	L6	C 0.75, Mn 0.40, Si 0.25, Cr 1.00, Ni 1.50	Oil Mach. 80 Movement +B
Cold Work Dies (Blanking, Forming)	ORION Oil Hardening	L2	C 0.50, Mn 0.70, Si 0.25, Cr 1.00, V 0.20	Oil Mach. 100 Movement +B
Cold Work Dies (Blanking, Forming)	SPARTA Air Hardening	A2	C 1.00, Mn 0.65, Si 0.25, Cr 5.25, V 0.25, Mo 1.10	Air Mach. 75 Movement +A
Cold Work Dies (Blanking, Forming)	SPARTA CV Air Hardening		C 2.30, Mn 0.65, Si 0.40, Cr 5.25, W 1.10, V 4.60, Mo 1.10	Air Mach. 60 Movement +A
Cold Work Dies (Blanking, Forming)	THERMOLD J Air Hardening		C 0.50, Mn 0.40, Si 1.10, Cr 5.00, V 1.00, Mo 1.40, Ni 1.50	Air Mach. 60 Movement +A
Cold Work Dies (Blanking, Forming)	ULTRADIE #1 Air Hardening	D3	C 2.25, Mn 0.30, Si 0.25, Cr 12.00, V 0.20	Air Mach. 50 Movement +A
Cold Work Dies (Blanking, Forming)	ULTRADIE #2 Air Hardening	D2	C 1.50, Mn 0.30, Si 0.25, Cr 12.00, V 0.20, Mo 0.80	Air Mach. 55 Movement +A
Cold Work Dies (Blanking, Forming)	ULTRADIE #3 Air Hardening	D2	C 1.50, Mn 0.30, Si 0.25, Cr 12.00, V 0.90, Mo 0.80	Air Mach. 55 Movement +A
Cold Work Dies (Blanking, Forming)	WANDO Oil Hardening	O1	C 0.90, Mn 1.20, Si 0.25, Cr 0.50, W 0.50, V 0.20	Oil Mach. 85 Movement +B
Cutting Tools (Finishing)	B-6 High Speed	T1	C 0.75, Mn 0.30, Si 0.35, Cr 4.00, W 18.00, V 1.20	Oil or Salt Mach. 60 Movement +B
Cutting Tools (Finishing)	B-9 High Speed	T2	C 0.84, Mn 0.30, Si 0.35, Cr 4.50, W 18.25, V 2.25, Mo 0.50	Oil or Salt Mach. 60 Movement +B
Cutting Tools (Finishing)	MOTUNG High Speed	M1	C 0.80, Mn 0.30, Si 0.35, Cr 4.00, W 1.50, V 1.15, Mo 8.50	Oil or Salt Mach. 65 Movement +B

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening. c
Cutting Tools (Finishing)	MOTUNG 652 High Speed	M2	C 0.83, Mn 0.30, Si 0.35, Cr 4.00, W 6.00, V 1.90, Mo 5.00	Oil or Salt Mach. 60 Movement + B
Cutting Tools (Finishing)	MOVAN High Speed	M10	C 0.88, Mn 0.30, Si 0.35, Cr 4.00, V 2.10, Mo 8.00	Oil or Salt Mach. 65 Movement + B
Cutting Tools (Finishing)	SATURN Water Hardening	F2	C 1.35, Mn 0.25, Si 0.25, W 3.50	Water Mach. 85 Movement + C
Cutting Tools (Finishing)	UNICUT High Speed	M3, Type 1	C 1.00, Mn 0.30, Si 0.35, Cr 4.00, W 6.25, V 2.40, Mo 6.25	Oil or Salt Mach. 60 Movement + B
Cutting Tools (Roughing)	B-7 High Speed	T4	C 0.72, Mn 0.30, Si 0.35, Cr 4.00, W 18.00, V 1.15, Mo 0.50, Co 5.00	Oil or Salt Mach. 60 Movement + B
Cutting Tools (Roughing)	B-8 High Speed	T8	C 0.78, Mn 0.30, Si 0.35, Cr 4.25, W 14.00, V 2.25, Mo 0.50, Co 5.00	Oil or Salt Mach. 60 Movement + B
Cutting Tools (Roughing)	B-10 High Speed	T5	C 0.78, Mn 0.30, Si 0.35, Cr 4.50, W 18.50, V 2.00, Mo 1.00, Co 9.00	Oil or Salt Mach. 55 Movement + B
Cutting Tools (Roughing)	SUPER MOTUNG High Speed	M30	C 0.82, Mn 0.30, Si 0.35, Cr 4.00, W 1.50, V 1.25, Mo 8.25, Co 5.00	Oil or Salt Mach. 65 Movement + B
Cutting Tools (Roughing)	SUPER UNICUT High Speed	M15	C 1.50, Mn 0.30, Si 0.35, Cr 4.00, W 6.25, V 4.75, Mo 3.25, Co 5.00	Oil or Salt Mach. 55 Movement + B
Cutting Tools (Roughing)	(See MOTUNG 652, UNICUT, Listed Above)			
Diecasting Dies	K-S Air Hardening	H14	C 0.40, Mn 0.35, Si 0.90, Cr 5.00, W 5.00, Mo 0.25	Air Mach. 65 Movement + A
Diecasting Dies	THERMOLD A Air Hardening	H11	C 0.35, Mn 0.40, Si 1.00, Cr 5.00, V 0.45, Mo 1.40	Air Mach. 70 Movement + A
Diecasting Dies	THERMOLD AV Air Hardening	H13	C 0.35, Mn 0.40, Si 1.00, Cr 5.00, V 1.00, Mo 1.40	Air Mach. 70 Movement + A
Gages	(See CYCLOPS SPECIAL, WANDO, SPARTA, ULTRADIE 1, ULTRADIE 3, MOTUNG, Listed Above)			
Hot Work Dies (Hot Forming)	ALCO S Oil Hardening	S1	C 0.50, Mn 0.25, Si 1.00, Cr 1.75, W 2.25, V 0.25, Mo 0.50	Oil Mach. 85 Movement + B
Hot Work Dies (Hot Forming)	B-4 Oil Hardening	H24-H25	C 0.50, Mn 0.30, Si 0.25, Cr 2.75, W 15.00, V 0.50	Oil Mach. 65 Movement + B
Hot Work Dies (Hot Forming)	B-6-X Oil Hardening	H26	C 0.50, Mn 0.25, Si 0.35, Cr 3.75, W 17.50, V 0.90	Oil Mach. 60 Movement + B
Hot Work Dies (Hot Forming)	B-44 Oil Hardening	H22	C 0.38, Mn 0.25, Si 0.35, Cr 3.00, W 11.00, V 0.40	Oil Mach. 65 Movement + B
Hot Work Dies (Hot Forming)	B-44-J Oil Hardening	H21	C 0.32, Mn 0.25, Si 0.35, Cr 3.25, W 9.50, V 0.50	Oil Mach. 70 Movement + B
Hot Work Dies (Hot Forming)	K-L Oil Hardening		C 0.35, Mn 0.60, Si 1.50, Cr 7.25, W 7.25	Oil Mach. 65 Movement + B
Hot Work Dies (Hot Forming)	K-M Oil Hardening		C 0.45, Mn 0.60, Si 1.50, Cr 7.25, W 7.25	Oil Mach. 65 Movement + B
Hot Work Dies (Hot Forming)	K-390 Oil Hardening		C 0.25, Mn 0.40, Si 0.40, Cr 2.75, W 10.00, Ni 2.00	Oil Mach. 55 Movement + B
Hot Work Dies (Hot Forming)	THERMOLD B Air Hardening	H12	C 0.35, Mn 0.40, Si 1.00, Cr 5.00 W 1.40, V 0.30, Mo 1.55	Air Mach. 70 Movement + A
Hot Work Dies (Hot Forming)	THOR Oil Hardening	H23	C 0.32, Mn 0.35, Si 0.50, Cr 12.00, W 12.00, V 1.00	Oil Mach. 50 Movement + B
Hot Work Dies (Hot Forming)	(See THERMOLD A, THERMOLD AV, THERMOLD J, K-S, ALCO M, Listed Above)			
Hot Work Dies (Hot Punching & Shearing)	(See MOTUNG P&D, ALCO M, ALCO S, B-6-X, B-44-J, THERMOLD A, THERMOLD AV, THERMOLD B, THERMOLD J, Listed Above)			
Plastic Molding Dies (Ejector Pins)	VENANGO SPECIAL Oil Hardening		C 0.65, Mn 0.50, Si 1.10, V 0.20, Mo 0.50	Oil Mach. 90 Movement + B
Plastic Molding Dies (Ejector Pins)	(See CLCLOPS SPECIAL & ALCO M, Listed Above)			
Plastic Molding Dies (Hubs)	(See N-9, WANDO, ALCO M, SPARTA, ULTRADIE 3, Listed Above)			
Plastic Molding Dies (Machine Cut Cavity)	THERMOLD Z Oil Hardening	P20	C 0.30, Mn 0.80, Cr, 0.80, Mo 0.25, Si 0.50	Oil Movement + A
Plastic Molding Dies (Machine Cut Cavities)	UNILOY 1435 Oil Hardening	420	C 0.40, Mn 0.40, Si 0.30, Cr 13.00	Oil Mach. 70 Movement + B
Plastic Molding Dies (Machine Cut Cavities)	UNILOY 1860 Oil Hardening	440A	C 0.60, Mn 0.40, Si 0.30, Cr 17.00	Oil Mach. 60 Movement + B
Plastic Molding Dies (Machine Cut Cavities)	(See WANDO, THERMOLD AV, THERMOLD B, SPARTA, Listed Above)			
Punching & Shearing	CYCLOPS 67 Water, Oil Hardening	S4-S5	C 0.55, Mn 0.90, Si 2.00, Mo 0.20	Water, Oil Mach. 90 Movement + C, + B
Punching & Shearing	VENANGO Oil Hardening	S2	C 0.50, Mn 0.45, Si 1.10, V 0.20, Mo 0.50	Oil Mach. 90 Movement + B
Punching & Shearing	(See DRACO, VENANGO SPECIAL, ORION, N-9, HERCULES, WANDO, ALCO M, ALCO S, SPARTA, ULTRADIE 1, ULTRADIE 2, ULTRADIE 3, MOTUNG P&D, Listed Above)			
Shock Resisting (Intermittent Impact)	(See ORION, N-9, DRACO, Listed Above)			
Shock Resisting (Repeated Impact)	(See CYCLOPS SPECIAL, CYCLOPS 67, VENANGO, VENANGO SPECIAL, N-9, ALCO M, ALCO S, Listed Above)			

VANADIUM-ALLOYS STEEL CO., Latrobe, Pa. (also Anchor Drawn Steel Co., Colonial Steel Co.)

Listing No. 74

Brick Mold Liners	CHROMEWEAR Air Hardening		C 2.30, Mn 0.70, Cr 5.25, W 1.10, Mo 1.10, V 4.75, Si 0.40	Air Mach. 40 Movement A
Cold Work Dies (Heading)	COLONIAL No. 14 Water Hardening	W1	C Opt, Mn 0.25, Si 0.25	Water Mach. 100 Movement C
Cold Work Dies (Heading)	COLONIAL No. 7 Water Hardening	W2	C Opt, Mn 0.25, V 0.20, Si 0.25	Water Mach. 100 Movement C

★ Last column indicates suggested Quenching Medium; Machinability Annealed, using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Cold Work Dies (Heading)	COLHED Water Hardening	W3	C 1.00, Mn 0.25, V 0.45, Si 0.25	Water Mach. 100 Movement C
Cold Work Dies (Blanking, Forming)	COLONIAL No. 4 Water Hardening	F2	C 1.30, Mn 0.25, W 3.50, Si 0.25	Water Mach. 45 Movement C
Cold Work Dies (Blanking, Forming)	AIR HARD Air Hardening	A2	C 1.00, Mn 0.60, Cr 5.25, Mo 1.10, V 0.25, Si 0.30	Air Mach. 85 Movement A
Cold Work Dies (Blanking, Forming)	HOTFORM No. 3 Air Hardening	A8	C 0.55, Mn 0.30, Cr 5.00, Mo 1.25, W 1.20	Air Mach. 70 Movement A
Cold Work Dies (Blanking, Forming)	COLONIAL No. 6 Oil Hardening	O1	C 0.95, Mn 1.20, Cr 0.50, W 0.50, V 0.20, Si 0.30	Oil Mach. 90 Movement A
Cold Work Dies (Blanking, Forming)	CROCAR Air, Oil Hardening	D4	C 2.20, Mn 0.20, Cr 12.00, V 0.40, Si 0.30, Mo 0.80	Oil, Air Mach. 40 Movement A
Cold Work Dies (Blanking, Forming)	OHIO DIE Air Hardening	D2	C 1.55, Mn 0.25, Cr 12.00, Mo 0.80, V 0.80, Si 0.38	Air Mach. 45 Movement A
Cold Work Dies (Blanking, Forming)	NEATRO Oil Hardening, High Speed	M4	C 1.27, Mn 0.25, Cr 4.50, W 5.50, Mo 4.50, V 4.00, Si 0.30	Oil Mach. 45 Movement A
Cold Work Dies (Lamination)	(See CROCAR, OHIO DIE, NEATRO, Listed Above)			
Cold Work Dies (Drawing)	(See COLONIAL No. 14, CROCAR, OHIO DIE, CHROMEWEAR, Listed Above)			
Cutting Tools (Roughing)	GRAY CUT COBALT Oil, Air Hardening, High Speed	T6	C 0.80, Mn 0.25, Cr 4.25, W 20.50, Mo 0.60, V 1.60, Co 12.25	Oil Mach. 45 Movement A
Cutting Tools (Roughing)	RED CUT COBALT Oil, Air Hardening, High Speed	T4	C 0.73, Mn 0.20, Cr 4.25, W 18.25, Mo 0.65, V 1.08, Co 4.75, Si 0.30	Oil Mach. 50 Movement A
Cutting Tools (Roughing)	RED CUT COBALT B Oil, Air Hardening, High Speed	T5	C 0.78, Mn 0.25, Cr 4.25, W 18.50, Mo 0.75, V 1.85, Co 8.75, Si 0.30	Oil Mach. 45 Movement A
Cutting Tools (Roughing, Finishing)	E.V.M. Oil, Air Hardening, High Speed	T2	C 0.85, Mn 0.25, Cr 4.25, W 18.10, V 2.00, Si 0.35	Oil Mach. 45 Movement A
Cutting Tools (Roughing, Finishing)	RED CUT SUPERIOR Oil, Air Hardening, High Speed	T1	C 0.72, Mn 0.20, Cr 4.00, W 18.00, V 1.00, Si 0.30	Oil Mach. 55 Movement A
Cutting Tools (Roughing, Finishing)	VAN CUT Oil, Air Hardening, High Speed	M3	C 1.02, Mn 0.25, Cr 4.00, W 6.25, Mo 6.25, V 2.50, Si 0.30	Oil Mach. 55 Movement A
Cutting Tools (Roughing, Finishing)	VAN-LOM Oil, Air Hardening, High Speed	M10	C 0.87, Mn 0.20, Cr 4.00, Mo 8.25, V 1.90, Si 0.30	Oil Mach. 60 Movement A
Cutting Tools (Roughing, Finishing)	VASCO SUPREME Oil, Air Hardening, High Speed	T15	C 1.57, Mn 0.25, Cr 4.75, W 12.50, V 5.00, Co 5.00, Si 0.25	Oil Mach. 45 Movement A
Cutting Tools (Roughing, Finishing)	VASCO SUPREME A Oil, Air Hardening, High Speed	M15	C 1.57, Mn 0.25, Cr 4.75, W 6.50, Mo 3.00, V 5.00, Co 5.00, Si 0.25	Oil Mach. 45 Movement A
Cutting Tools (Roughing, Finishing)	VASCO M2 Oil, Air Hardening, High Speed	M2	C 0.84, Mn 0.25, Cr 4.20, W 6.35, Mo 5.00, V 1.90, Si 0.30	Oil Mach. 55 Movement A
Cutting Tools (Roughing, Finishing)	VASCO M7 Oil, Salt Hardening, High Speed	M7	C 0.99, Mn 0.25, Cr 0.375, W 1.75, Mo 8.75, V 2.05	Oil Mach. 60 Movement A
Cutting Tools (Roughing, Finishing)	S-N-2 Oil Hardening, High Speed	M1	C 0.81, Mn 0.25, Cr 3.80, W 1.60, Mo 8.70, V 1.15, Si 0.25	Oil Mach. 60 Movement A
Cutting Tools (Roughing, Finishing)	(See NEATRO, Listed Above)			
Cutting Tools (Drills)	(See VASCO M2, VASCO M7, Listed Above)			
Cutting Tools (Taps)	RED STAR TUNGSTEN Oil Hardening	O7	C 1.20, Mn 0.25, Cr 0.70, W 1.60, Mo 0.25, V 0.20, Si 0.30	Oil Mach. 90 Movement C
Cutting Tools (Taps)	(See VASCO M2, VASCO M7, RED CUT SUPERIOR, Listed Above)			
Cutting Tools (Thread Chasers)	(See VASCO M2, RED CUT SUPERIOR, Listed Above)			
Diecasting Dies (Molds, Ejector Pins)	HOTFORM Air Hardening	H11, 12	C 0.35, Mn 0.30, Cr 5.00, W Opt, Mo 1.40, V 0.45, Si 0.90	Air Mach. 75 Movement A
Diecasting Dies (Molds, Ejector Pins)	HOTFORM V Air Hardening	H13	C 0.35, Mn 0.35, Cr 5.25, Mo 1.25, V 1.05, Si 1.00	Air Mach. 70 Movement A
Diecasting Dies (Trimming Dies)	(See COLONIAL No. 6, AIR HARD, OHIO DIE, CROCAR, Listed Above)			
Gages	(See COLONIAL No. 6, CROCAR, CHROMEWEAR, Listed Above)			
High Stress Machinery Parts	NIKRO M Oil Hardening	L6	C 0.70, Mn 0.55, Cr 0.85, Mo 0.25, Si 0.30, Ni 1.40	Oil Mach. 75 Movement A
High Stress Machinery Parts	VANADIUM TYPES D, G, H, K, N Water, Oil Hardening	L2	C Opt, Mn 0.20, Cr 0.80, V 0.20, Si 0.25	Water Mach. 90 Movement C
High Stress Machinery Parts	VANADIUM TYPE BB Water, Oil Hardening	L3	C 1.00, Mn 0.32, Cr 1.40, V 0.20, Si 0.25	Water Mach. 85 Movement C
Hot Work Dies (Hot Forming)	FORGE DIE Oil Hardening	H25	C 0.26, Mn 0.25, Cr 3.50, W 14.00, V 0.50, Si 0.25	Oil Mach. 55 Movement A
Hot Work Dies (Hot Forming)	HOTFORM No. 3 Air Hardening		C 0.55, Mn 0.30, Cr 5.00, W 1.20, Mo 1.25, Si 0.90	Air Mach. 75 Movement A
Hot Work Dies (Hot Forming)	HOTPRESS Oil Hardening	H20	C 0.35, Mn 0.25, Cr 2.00, W 9.25, V 0.50, Si 0.25	Oil Mach. 60 Movement A
Hot Work Dies (Hot Forming)	JET FORGE Air Hardening		C 0.47, Mn 0.30, Cr 7.75, Mo 1.35, V 1.40, Si 0.90	Air Mach. 75 Movement A
Hot Work Dies (Hot Forming)	MARVEL Oil Hardening	H21	C 0.33, Mn 0.20, Cr 3.50, W 9.75, V 0.45, Si 0.30	Oil Mach. 60 Movement A
Hot Work Dies (Hot Forming)	RED CUT SUPERIOR J Oil Hardening	H26	C 0.52, Mn 0.20, Cr 4.00, W 18.00, V 1.00, Si 0.32	Oil Mach. 55 Movement A
Hot Work Dies (Hot Forming)	SC SPECIAL Oil Hardening	H24	C 0.49, Mn 0.30, Cr 3.00, W 14.50, V 0.50, Si 0.30	Oil Mach. 55 Movement A
Hot Work Dies (Hot Forming)	WCC Oil Hardening		C 0.40, Mn 0.30, Cr 4.25, W 4.25, Mo 0.40, Co 4.25, V 2.10, Si 0.30	Oil Mach. 75 Movement A
Hot Work Dies (Hot Forming)	WW HOTWORK Oil Hardening	H23	C 0.32, Mn 0.35, Cr 12.00, W 12.00, V 1.05, Si 0.50	Oil Mach. 55 Movement A
Hot Work Dies (Hot Forming)	(See HOTFORM, Listed Above)			
Hot Work Dies (Hot Punching & Shearing)	(See HOTFORM, MARVEL, Listed Above)			

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Plastic Molding Dies (Machined Cavity)	MC Oil Hardening	P20	C 0.35, Mn 0.85, Cr 0.85, Mo 0.40, Si 0.40	Oil Mach. 85 Movement A
Plastic Molding Dies (Machined Cavity)	SPEED CUT Oil Hardening	P20	C 0.43, Mn 0.85, Cr 1.15, Mo 0.50, Si 0.30	Oil Mach. 140 Movement A
Plastic Molding Dies (Machined Cavity)	NI-MOLD Air, Oil Hardening	T6	C 0.10, Mn 0.30, Cr 1.60, Ni 3.50, Si 0.30	Air, Oil Mach. 90 Movement + A (Air) Movement + B (Oil)
Plastic Molding Dies (Hubs)	PAR-EXC Oil Hardening	S1	C 0.53, Mn 0.20, Cr 1.65, W 2.00, V 0.25, Si 0.28	Oil Mach. 80 Movement A
Plastic Molding Dies (Hubs)	(See COLONIAL No. 6, AIR HARD, CROCAR, OHIO DIE, Listed Above)			
Plastic Molding Pins (Ejector Pins)	(See HOTFORM, Listed Above)			
Punching & Shearing	MOSIL Oil Hardening	S5	C 0.57, Mn 0.85, Cr 0.25, Mo 0.35, V 0.20, Si 1.90	Oil Mach. 85 Movement B
Punching & Shearing	SIMOCH Air Hardening	S7	C 0.48, Mn 0.30, Cr 3.25, Mo 1.40, V 0.25, Si 0.90	Air Mach. 75 Movement A
Punching & Shearing	SILMAN Water, Oil Hardening	S4	C 0.55, Mn 0.85, Cr 0.25, V 0.20, Si 2.00	Water Mach. 85 Movement C
Punching & Shearing	(See AIR HARD, COLONIAL No. 7, HOTFORM No. 3, OHIO DIE, Listed Above)			
Shear Knives	(See AIR HARD, CROCAR, OHIO DIE, Listed Above)			
Shock Resisting (Intermittent & Repeated Impact)	(See SILMAN, MOSIL, PAR-EXC, COLONIAL No. 7, HOTFORM No. 3, SIMOCH, Listed Above)			
Thread Rolling	(See OHIO DIE, Listed Above)			

VASCOLOY-RAMET CORP., 800 Market St., Waukegan, Ill. — Listing No. 75

- Ceramic Cutting Tools (Precision Ground Throwaways) — VASCOLOY-RAMET VR-97
- Cutting Tools (Finishing, Cast Iron, Nonferrous) — VASCOLOY-RAMET 2A7, Carbide
- Cutting Tools (Finishing, Steel) — VASCOLOY-RAMET E, Carbide
- Cutting Tools (General Purpose, Cast Iron, Nonferrous) — VASCOLOY-RAMET 2A5, Carbide
- Cutting Tools (General Purpose, Heavy Machining, Steel) — VASCOLOY-RAMET VR-75, Carbide
- Cutting Tools (General Purpose, Steel) — VASCOLOY-RAMET EM, Carbide
- Cutting Tools (Heavy Roughing & Interrupted Cuts, Cast Iron & Nonferrous) — VASCOLOY-RAMET 2A3, Carbide
- Cutting Tools (Heavy Roughing & Interrupted Cuts, Steel) — VASCOLOY-RAMET VR-77, Carbide
- Cutting Tools (Hot Weld Flash Machining, Steel) — VASCOLOY-RAMET VR-87, Carbide
- Cutting Tools (Light Roughing, Finishing, Steel) — VASCOLOY-RAMET VR-73, Carbide
- Cutting Tools (Milling, Rotary Burring, etc., Cast Iron & Nonferrous) — VASCOLOY-RAMET VR-54, Carbide
- Cutting Tools (Planing, Steel) — VASCOLOY-RAMET AW, Carbide
- Cutting Tools (High Speed Finishing & Precision Boring) — VASCOLOY-RAMET VR-65, Carbide
- Cutting Tools (Precision Boring, Light Finishing, Steel) — VASCOLOY-RAMET EH, Carbide
- Cutting Tools (Roughing & Finishing, Cast Iron & Steel) — VASCOLOY-RAMET TANGUNG, Cast Alloy
- Cutting Tools (Roughing Cuts, Cast Iron, Nonferrous) — VASCOLOY-RAMET 2A68, Carbide
- Cutting Tools (Roughing Cuts, Steel) — VASCOLOY-RAMET EE, Carbide
- Dies (Deep Drawing) — VASCOLOY-RAMET 2A3, Carbide
- Dies (Fine Wire Drawing) — VASCOLOY-RAMET 2A68, Carbide
- Dies (Heading) — VASCOLOY-RAMET AX, Carbide
- Dies (Heavy Duty Heading) — VASCOLOY-RAMET AY, Carbide
- Dies (Wire Drawing) — VASCOLOY-RAMET 2A6, Carbide
- Mechanical Applications (Good Wear Resistance, Light Shock Resistance) — VASCOLOY-RAMET 2A68, Carbide
- Mechanical Applications (High Wear Resistance) — VASCOLOY-RAMET 2A5, Carbide
- Mechanical Applications (High Oxidation & Corrosion Resistance) — VASCOLOY-RAMET TANTUNG, Cast Alloy
- Mechanical Applications (Moderate Wear Resistance, High Shock Resistance) — VASCOLOY-RAMET 2A3, Carbide
- Mining Applications (Excellent Wear Resistance, Moderate Shock Resistance) — VASCOLOY-RAMET 2A6, Carbide
- Mining Applications (Good Wear Resistance, High Shock Resistance) — VASCOLOY-RAMET VR-13, Carbide
- Mining Applications (Wear Resistance, Very High Shock Resistance, Geophysical Drilling) — VASCOLOY-RAMET 9632, Carbide

WESSON CO., 1220 Woodward Heights Blvd., Detroit 20, Mich. — Listing No. 76

- Cutting Tools (Heavy Rough Turning, Cast Iron, Nonferrous) — GS, Carbide
- Cutting Tools (General Purpose Machining, Cast Iron, Nonferrous) — GI, Carbide
- Cutting Tools (Finish Machining, Cast Iron, Nonferrous) — GA, Carbide
- Cutting Tools (Precision Finishing, Cast Iron, Nonferrous) — GF, Carbide
- Cutting Tools (Heavy Rough Turning, Forged, Rolled, Cast Steel) — HR, WS, Carbide
- Cutting Tools (General Purpose Machining, Steel) — WM 26, Cabide
- Cutting Tools (Light Roughing, Finishing Steel) — WH, Carbide
- Cutting Tools (Precision Finishing, Steel) — WH, Carbide
- Cutting Tools (Heavy Duty Metal Cutting, Shock Resistance) — M, Carbide
- Cutting Tools (High Velocity, Finishing Steel) — HV, Carbide
- Cutting Tools (Rough Machining, Aluminum) — GS, Carbide
- Cutting Tools (Finish Machining, Aluminum) — GI, Carbide
- Mechanical Application (Extreme Wear Resistance) — GI, Carbide
- Mechanical Application (Wear & Light Shock Resistance) — GS, Carbide
- Mechanical Application (Wear & Heavy Shock Resistance) — M, Carbide

WHEELOCK, LOVEJOY & CO. INC., 128 Sidney St., Cambridge 39, Mass. — Listing No. 77

Cold Work Dies	HY-TEN "M" TEMPER L6 Oil Hardening		C 0.70, Cr, Ni, Mo	Oil	Mach. 100 + Movement + B
Diecasting Dies	HY-TEN MOLD	P20	C 0.35, Mn, Cr, Mo	Oil	Mach. 100 + Movement + B
Gage	(See HY-TEN "M" TEMPER, Listed Above)				
High Stress & High Wear Machinery Parts	HY-TEN "B" #3-X		C 0.50, Mn, Cr, Mo	Oil	Mach. 100 + Movement + B

★ Last column indicates suggested Quenching Medium; Machinability Annealed, using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

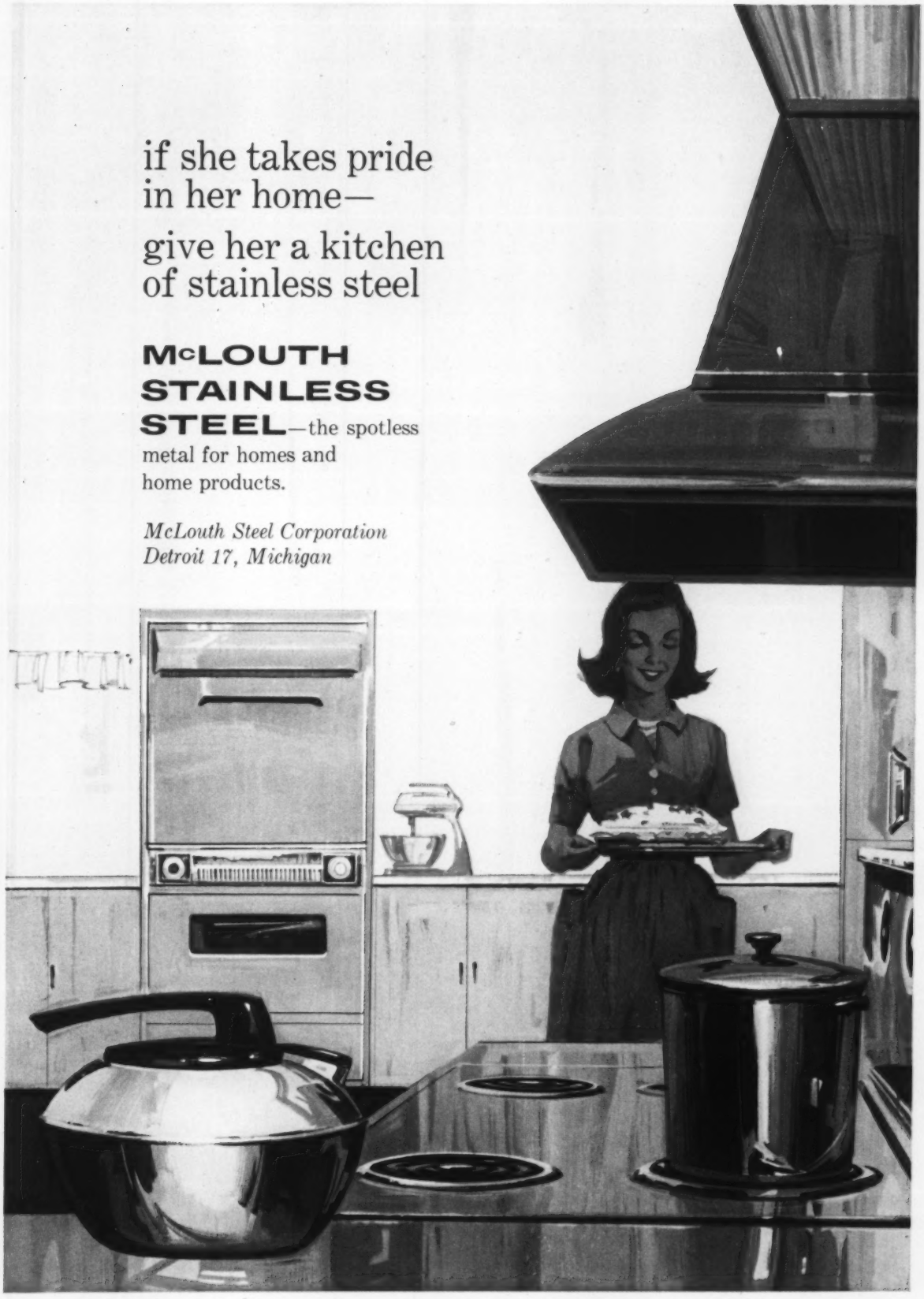
PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
High Stress & High Wear Machinery Parts	HY-TEN "B" #3X-40		C 0.40, Mn, Cr, Mo	Oil Mach. 100+ Movement + B
Plastic Molding Dies	(See HY-TEN MOLD, HY-TEN "M" TEMPER, Listed Above)			
Press Brake Dies	(See HY-TEN "B" #3-X, Listed Above)			
Punching & Shearing	(See HY-TEN "M" TEMPER, Listed Above)			
Shock Resisting	HY-TEN PNEUMATIC S5 Chisel Steel, Oil Hardening		C 0.60, Si, Mn, Cr	Oil Mach. 75 Movement + B
Shock Resisting	(See HY-TEN "M" TEMPER, Listed Above)			

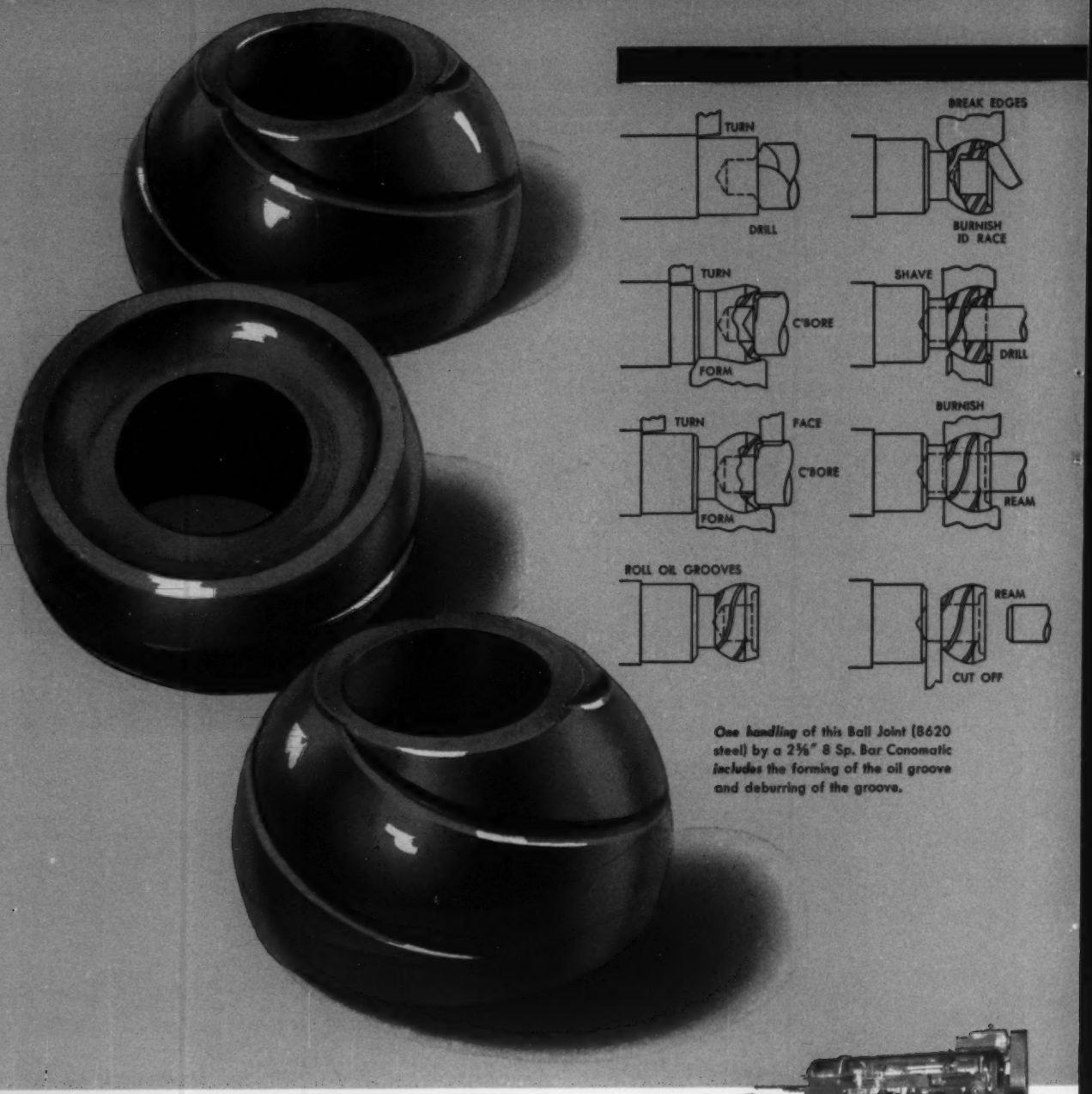
WILLEY'S CARBIDE TOOL CO., 1340 W. Vernor Highway, Detroit 1, Mich. — Listing No. 78

Cutting Tools (Chip Removal, Cast Iron, Nonferrous Roughing) — E-8, Carbide
Cutting Tools (Chip Removal, Cast Iron, Nonferrous General Purpose) — E-6, Carbide
Cutting Tools (Chip Removal, Cast Iron, Nonferrous Light Finishing) — E-5, Carbide
Cutting Tools (Chip Removal, Cast Iron, Nonferrous Precision Finishing) — E-3, Carbide
Cutting Tools (Chip Removal, Steel, Roughing) — 8-A, Carbide
Cutting Tools (Chip Removal, Steel, Heavy Duty Machining) — 945, Carbide
Cutting Tools (Chip Removal, Steel, General Purpose) — 710, Carbide
Cutting Tools (Chip Removal, Steel Precision Finishing) — 4-A, Carbide
Cutting Tools (Chip Removal, Heavy Duty Machining) — 10-A, Carbide
Cutting Tools (Chip Removal, Steel, Finishing & Light Roughing) — 606, Carbide
Cutting Tools (Chip Removal, Steel, Precision Finishing) — 509, Carbide
Cutting Tools (High Speed Finishing) — 6A, Carbide
Wear & Impact Applications (Light Impact, Extreme Wear Resistant) — E-13, Carbide
Wear & Impact Applications (Medium Impact, Wear Resistant) — E-18, Carbide
Wear & Impact Applications (Heavy Impact, Wear Resistant) — E-25, Carbide

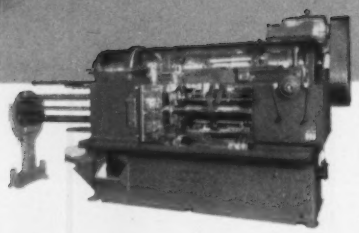
ZIV STEEL & WIRE CO., 2945 W. Harrison St., Chicago 12, Ill. — Listing No. 79

Blacksmithing Tools	ZIVCO	W1	C 0.85-0.95	Water
Cold Work Dies (Blanking, Cold Forming)	REGULAR	W1	C 0.95-1.10	Water
Cold Work Dies (Blanking, Cold Forming)	ZIVCO VANADIUM	W2	C 1.00-1.10, V 0.15-0.25	Water
Cold Work Dies (Blanking)	HARGUS	O1	C 0.85-0.95, Mn 1.00-1.25, Cr 0.50, W 0.50	Oil
Cold Work Dies (Forming, Punches, Rolls)	PRK-33 COBALTCROM	D5	C 1.30-1.50, Mn 0.20-0.30, Cr 12.50-14.50, Mo 0.65-0.75, Co 3.00-3.50, Si 0.40-0.65, Ni 0.50	Air
Cold Work Dies (Blanking, Forming)	NEOR High Carbon, High Chrome	D3	C 2.10-2.20, Mn 0.40-0.60, Cr 12.75-13.75, Si 0.30-0.60, Ni 0.50	Oil or Air
Cold Work Dies (Rolls)	DUMORE	A2	C 0.95-1.05, Mn 0.50-0.80, Cr 5.00-5.50, Mo 0.95-1.25	Air
Cold Work Dies (Blanking, Forming, Rolls, etc.)	LUBRI-DIE	O-6	C 1.35-1.50, Mn 0.40-1.00, Mo 0.20-0.30, Si 0.75-1.25	Oil
Cold Work Dies (Blanking, Forming, Punches, Rolls, etc.)	DARWIN #1	D2	C 1.50, Mn 0.35, Cr 11.00-13.00, Mo 0.75, Si 0.40, Ni 0.40, V 0.80	Air
Cutting Tools (Roughing & Finishing)	RED SHADOW High Speed	M2	C 0.75-0.85, Cr 4.00-4.25, Mo 4.75-5.25, W 6.00-6.50, V 1.80-2.00	Oil or Air
Cutting Tools	SUPER HIGH SPEED	T1	C 0.65-0.75, Cr 3.50-4.50, W 17.50-19.00, V 0.90-1.20	Oil or Air
Cutting Tools (Finishing)	BRM HIGH SPEED	T2	C 0.75-0.85, W 17.50-19.00, Cr 3.75-4.25, V 1.75-2.25, Mo 0.65-0.75	Oil or Air
Cutting Tools (Finishing)	COBALT HIGH SPEED	T4	C 0.65-0.75, W 18.50-19.50, Cr 4.25-4.75, V 0.75-1.25, Co 5.00	Oil or Air
Cutting Tools (Finishing)	ZIP HIGH SPEED	T5	C 0.70-0.75, W 18.50-19.50, Co 8.00, Cr 4.25-4.75, V 1.75-2.00, Mo 0.75-1.25	Oil or Air
Diecasting Dies	MAXIMOLD	H13	C 0.35-0.45, Cr 5.10-5.35, Mo 1.10-1.25, Si 0.95-1.05, V 0.95-1.10	Oil or Air
Gages	(See NEOR, Listed Above)			
Hobs	WIZARD Carburized	S1	C 0.40-0.50, Mn 0.20-0.40, Cr 0.85-0.95, W 0.90-1.00, Mo 0.20	Water
Hobbed Cavity Dies	HOB-A-DIE	P2	C 0.06, Mn 0.30, Cr 1.00, Mo 0.25, Si 0.20	Oil
Hot Work Dies (Hammer, Upsetter & Press)	H.P.D.	H12	C 0.35, Cr 5.15, Mo 1.55, Si 1.05, W 1.25, V 0.30	Oil or Air
Hot Work Dies (Diecasting)	(See MAXIMOLD, Listed Above)			
Hot Work Dies (Hammer)	TYPLEX		C 0.35-0.45, Mn 0.25-0.50, Cr 1.25-1.75, Mo 0.60-0.90, Ni 4.00-4.50	Air
Hot Work Dies (Upsetter & Press)	(See TYPLEX, Listed Above)			
Machinery Parts	ZIVAN-45	L2	C 0.40-0.50, Mn 0.60-0.90, Cr 0.80-1.10, V 0.15 min.	Oil
Plastic Molding Dies (Machined Cavity)	NEWMAX Preheat Treated		C 0.45-0.53, Mn 0.75-1.00, Cr 0.80-1.10, Mo 0.15-0.25, Si 0.20-0.35	.....
Plastic Molding Dies	(See HOB-A-DIE, Listed Above)			
Punching & Shearing	(See DUMORE, Listed Above)			
Punching & Shearing	PLANCHER	S5	C 0.55-0.65, Mn 0.70-0.90, Si 1.85-2.10, Mo 0.40-0.50	Oil or Water
Shock Resisting	(See WIZARD, Listed Above)			Oil
Shock Resisting	TOUGHDIE		C 0.45-0.55, Mn 0.60-0.70, Cr 3.00-3.25, Mo 1.30-1.40, Si 0.25	Oil or Air


if she takes pride
in her home—
give her a kitchen
of stainless steel
McLOUTH
STAINLESS
STEEL—the spotless
metal for homes and
home products.
McLouth Steel Corporation
Detroit 17, Michigan



One handling **of this Ball Joint (8620 steel) by a 2⅝" 8 Sp. Bar Conomatic *includes* the forming of the oil groove and deburring of the groove.**



Those cost-saving EIGHTS!

With more work spindles and tooling positions for including — in one chucking — operations that would otherwise require the expense of second handling, you just can't *beat* THOSE COST-SAVING EIGHTS.

Likewise, as replacements of four spindle machines — on more simple work — with double stock feed and double setup, producing two pieces per cycle, nothing *compares* with THOSE COST-SAVING EIGHTS.

For ever-increasing work requirements — in less floor space, with less power, less coolant, less lubricant and maintenance, and less transfer and paper work — many "automatic" users are finding THOSE COST-SAVING EIGHTS more *profitable*. How about *you*?

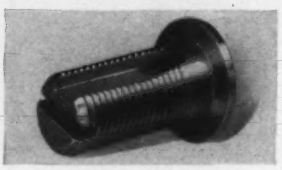
Write, wire, or phone *today* for particulars. There is no obligation. Cone Automatic Machine Company, Inc., P.O. Box 27, Windsor, Vermont.

Conomatic

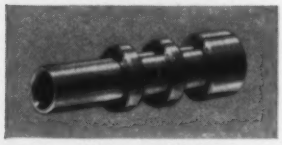
World's Most Productive Line of Automatic Lathes

Consistent, *dependable* handling of one or more of the following operations in a single setup has earned the CONOMATIC an enviable reputation as the *leader* of THOSE COST-SAVING EIGHTS: cross drilling and milling, end milling, broaching, spinning, stamping, OD and ID burnishing, eccentric drilling, turning and boring, eccentric forming, multiple hole drilling and tapping, oil groove rolling, back facing, back slotting, back hole drilling and counterboring, induction hardening and quenching.

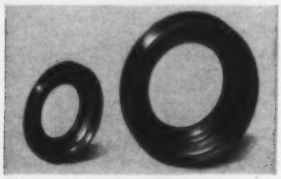
One handling of this Sleeve (B-1112 steel) on a 1¾" 8 Sp. Bar Conomatic *includes* offset milling.



One handling of this Threaded Stud on a 1" 8 Sp. Bar Conomatic *includes* cross milling, slotting, thread chasing, and back facing (all operations without stopping the work spindles).

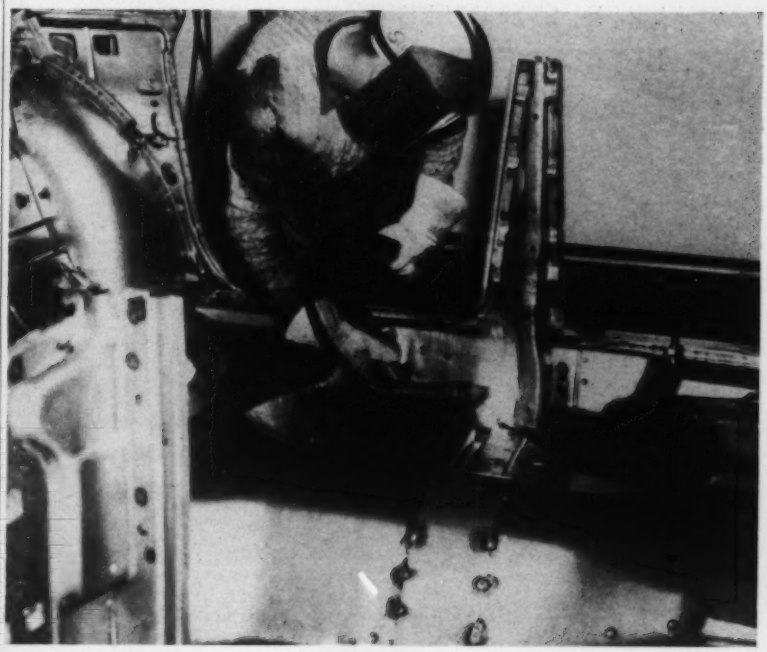


One handling of this Valve Bushing (8620 steel) by a 1" 8 Sp. Bar Conomatic *includes* cross drilling of 4 holes and back counterboring of large hole.



One handling of these bearing cups by a 3" 8 Spindle Bar Conomatic *includes* burnishing, induction hardening and quenching of the ball race.

One handling of this Ball Joint Housing (1012 steel) by a 2⅝" 8 Sp. Bar Conomatic *includes* burnishing inner ball race.



Arcspots Speed Auto Body Production

• ARC SPOTWELDERS are cutting production time as much as 40 per cent in Detroit auto plants, claim J. A. Howery and G. F. Mack, National Cylinder Gas Div., Chemetron Corp., Chicago.

They told participants at the annual meeting of the American Welding Society, New York, that the process can lay down 1500 spots an hour in auto bodies—speeds which are 3 to 20 times faster than older welding methods.

Material costs are said to be comparable to those of older methods —physical properties of the welds are equal or higher. One ⅝ in. spotweld is about equivalent to an inch of arcweld, say Messrs. Howery and Mack.

• Automatic electronic equipment overcomes control inadequacies which have been a major block to the consumable electrode spotwelding of mass produced items.

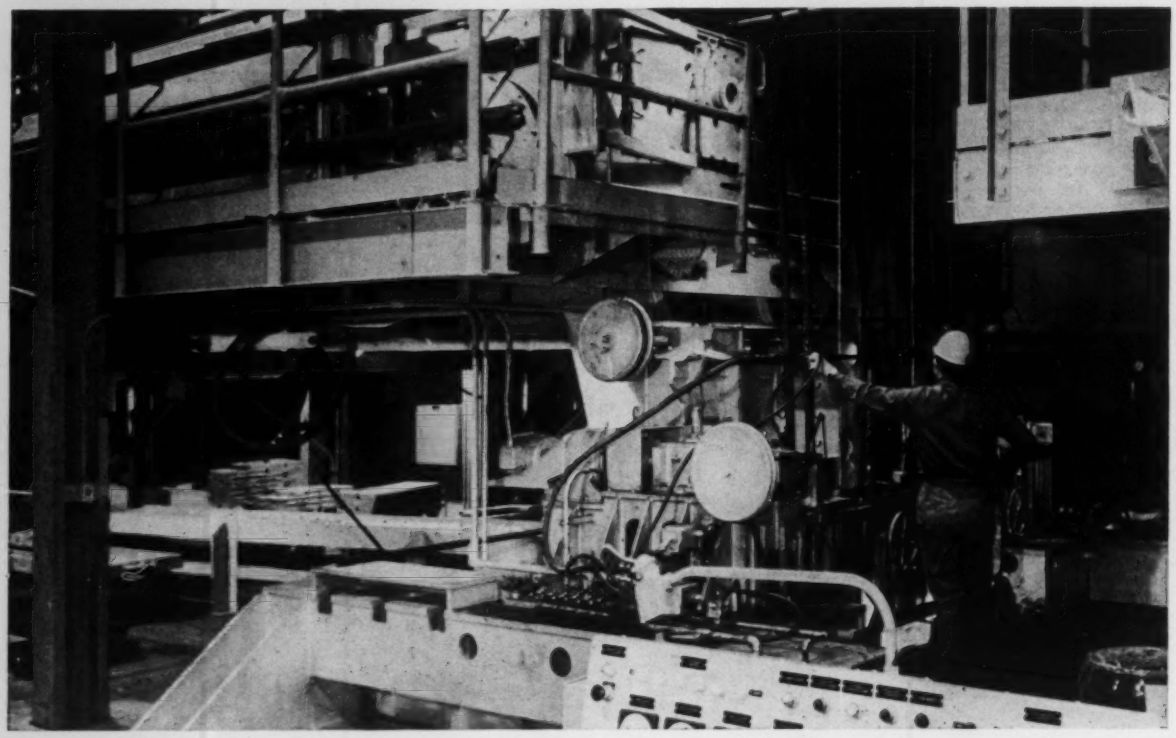
The characteristics of the nugget shaped welds made by an arc spotwelder are controlled by arc duration and electrode feed rate. The problems of the electrode freezing in the molten pool and electrode burnback into the gun have been eliminated by a burnback control unit, claim Messrs. Howery and Mack.

• The process can handle carbon and alloy steels.

Low and medium carbon and low alloy steels up to ¼ in. thick are readily joined with arcspots. The method also works well on stainless and aluminum alloys.

The continuous electrode employed is either solid or flux cored and 3/64 to 3/32 in. in diameter. An argon-oxygen mixture or carbon dioxide provides shielding.

The gun (the business end) is water cooled and ruggedly constructed, says National Cylinder Gas. It is operated with a spring loader trigger. An operator only has to touch the gun to the work and pull the trigger. The equipment takes over and completes the weld automatically.



Annealing capacity helps meet varying product needs . . .

Diversified Market Served By New Galvanizing Line

• **PRODUCT VERSATILITY was a vital consideration in the design of a galvanizing line that went into operation recently at Midwest Steel Div., Portage, Ind., of National Steel Corp. The facility is said to include equipment that isn't ordinarily incorporated in a single line.**

Reason: The division intends to satisfy demands for a wide range of flat rolled, galvanized products in the Chicago area with the line.

The Midwest market is one of the most diversified in the U. S. It includes fabricators of industrial and agricultural equipment, and it's more of a small order market than the Eastern market is.

The division's aim: To satisfy users of relatively small lots and also be able to handle larger orders.

• **The galvanizing line includes equipment for electrolytic cleaning and a multizone, gas fired annealing furnace. Heat for the zinc pot is transmitted from the annealed strip.**

Some of the equipment probably wouldn't be duplicated on all lines in a plant that operated three or four. Examples: Cleaning, scrubbing, side trimming, and quenching facilities, or systems for chemical treatment, printing, oiling, and leveling.

Galvanized material 24 to 48 in. wide is produced in coils up to 66 in. in diameter. If the material is to be delivered in sheets, it is cut into lengths of 4 to 16 ft with a Hallden shear.

Auxiliary leveling facilities are available if the customer specifies more than standard flatness. And shearing equipment is available for resquaring sheets to extremely close tolerances, or for filling orders for sheet lengths not available from the line.

• **Several gages of sheets are produced. And gaging at the entry and exit ends of the line insures uniform thickness.**

The facility turns out galvanized coils or sheets in thicknesses up to 14 gage. Minimum thickness is 30 gage.

X-ray gages, mounted on the two pass lines ahead of the coil welder, indicate strip gage at the entry end.

At the exit end of the line, the strip passes over an inspection conveyor and through a Voss leveler, which insures extreme flatness. The final inspection is selective, instead

HOT STRIP MILLS

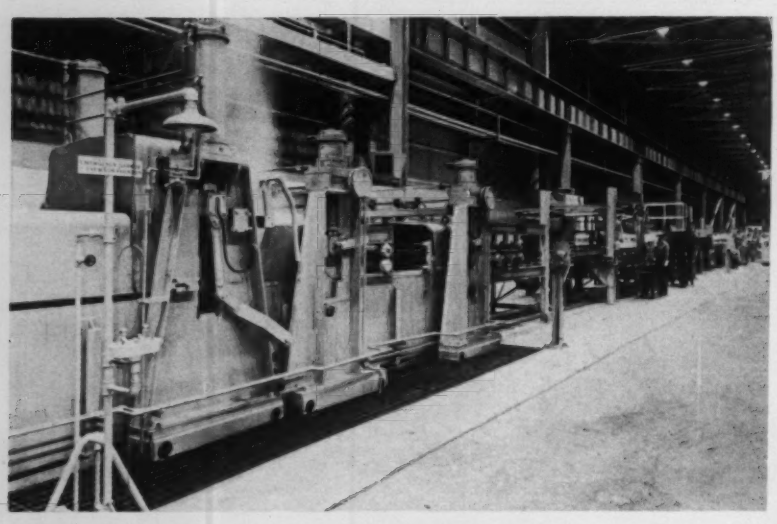
Designed and Built by MESTA

Mesta 80" Four-High Continuous Hot Strip Mill—Finishing Stands Installed at the Fairless Works, U. S. Steel Corporation

Designers and Builders of Complete Steel Plants

MESTA MACHINE COMPANY

PITTSBURGH, PENNSYLVANIA



Chemical treating protects product in storage

Final inspection culls offgage sheets

of automatic; the inspector receives a time delayed warning of offgage material from gage sensors ahead of the inspection table. That warning arrives as questionable footage passes through the shear, so offgage sheets can be segregated.

• Physical properties of the product can be varied to suit customer requirements because the line has adequate annealing capacity.

Furnace capacity beyond the requirements for standard galvanized products makes it possible to offer fabricators a wide range of base materials—of different hardnesses and analyses. It isn't difficult to give the customer a hard product; it's more of a problem to produce soft materials.

Coils must be cleaned carefully if the oil used in cold rolling isn't controlled by the galvanizing facility. The line is said to have adequate cleaning and scrubbing equipment to remove all known types of rolling lubricants.

• Fast changing of coating rolls and storage tanks for cleaning and chemical treatment solutions helps keep downtime to a minimum.

A crane changes the coating roll assembly in the zinc pot. (The rolls are changed periodically to insure quality coating and to provide variations in weight or other characteristics.) The crane removes the rolls and installs another set in about 30 minutes (2 hours is usually considered standard for the job).

Storage tanks hold the electrolytic cleaning solution while the line is being cleaned or repaired. That prevents waste—the liquid can be pumped back into the processing tank when maintenance is finished. The storage is also useful as a "buffer" between the processing line and the waste disposal system, to prevent the pumping of surplus solution into a treatment plant.

Similar storage and pumping facilities handle used chemical treatment solutions.

Design, Material Changes Improve Automatic Washers

REDESIGN and changes in materials are said to make for better automatic washers at Kelvinator Div., Detroit, American Motors Corp.

The number of parts in the automatic lint filter has been reduced from 25 to 3. The filter system is said to be 50 per cent more efficient than the one it replaced. An aluminum stamping about 1/32 in. thick in the filter strainer was replaced by a plastic part about 3/32 in. thick. The weight difference isn't significant, but the use of plastic (permissible in the new splash filter) reportedly reduced costs 40 per cent.

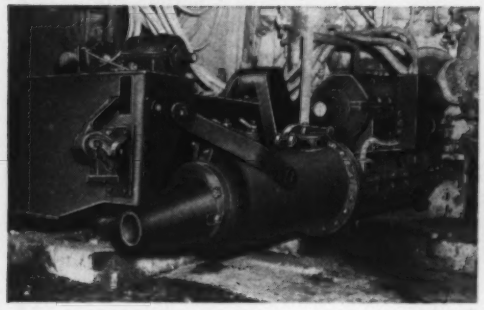
On the same line of washers and dryers, a one piece, stamped aluminum insert—1/32 in. thick—replaced two parts (one aluminum and the other plastic about 3/32 in. thick) on the control panels. The change was made to provide more design flexibility, improve appearance, and to simplify fabrication, says the division.

Lettering and trim are silk screened on the aluminum panel, so the division can use the same part for different models.

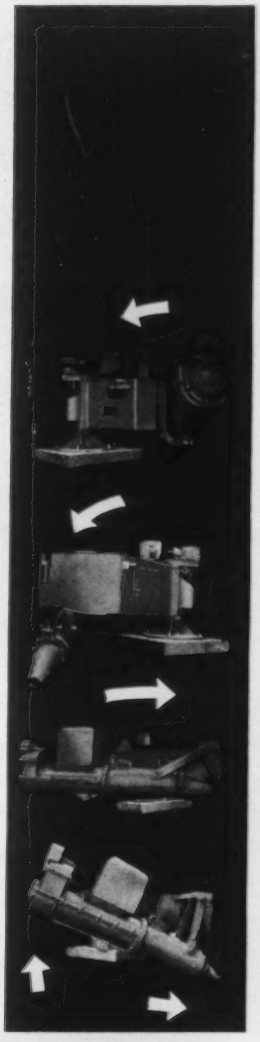
ACCURACY+POWER

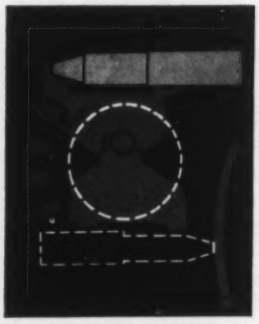
FOR MAINTAINING LONG TAPPING HOLES

BAILEY CLAY GUNS



Precisely accurate due to unique mounting and 3-motor operation, Bailey Clay Guns furnish the high clay pressures (642 to 1150 psi) which are so necessary with the new coke-tar tapping hole mixes now being used on many furnaces. Designed for safety and reliability in blast furnace and large electric furnace applications, there are more than 170 in service. *Write for Bulletin.*





Clear of the tapping hole when not in use, Gun swings to the correct position for moving into the tapping hole.

WILLIAM M. **BAILEY** COMPANY · 1221 BANKSVILLE ROAD, PITTSBURGH 16, PA.

VICE PRESIDENT-Operations

reports:

Soffel's

EXOTHERMIC SIDEBOARDS

"Give us the most flexible hot topping method we've ever known."

Of course, increased ingot *yield* is easily translated into the extra hundreds of dollars in out the door products.

Equally important, though not so obvious, are the labor-saving advantages you gain when you use Soffel's Sideboards.

Starting with the placement of the Sideboards in the mold, no crane is necessary except on the very large ingots. There's no interruption in pouring—pour straight up to the top. The ingot is single stripped, goes to the soaking pit quickly. All these steps reduce time and reflect in overall cost.

If you want more sound steel from every ingot, Soffel's Exothermic Sideboards will give it to you. Test them in your plant soon.

Use Soffel's EXOTHERMIC SIDEBOARDS in BIG END DOWN MOLDS

PRODUCT ADVANTAGES

- **Eliminate permanent and conventional hot tops.**
- **Easy, and single, stripping of Big End Down molds.**
- **Sideboards are easily placed in head of mold by one man — crane only necessary on very large ingots.**
- **Longer mold life — less mold cost — less mold inventory to carry.**

Soffel's Exothermic Sideboards increase ingot yield, assure top cut soundness and provide more ton steel out the door per ton of steel in the ingot.

Phone National 5-1571 today

Pittsburgh Metals Purifying Co.

A Division of Treesdale Laboratories, Inc.

MARS, PENNSYLVANIA

Diamond Tool Lasts Longer, Costs Less

• **LONGER LASTING, more reliable diamond tools that cost less are claimed to be the benefits of a new chemical bonding method developed by Vacuum Research Corp., Forest Hills, N. Y.**

Instead of being held in a soft, nonferrous matrix, the diamonds are bonded chemically to the steel holder, says Charles Horn, engineering manager. The process is carried out in a vacuum. Other results claimed for the method:

• Adhesion is so strong that up to 75 per cent of the diamond may protrude from the holder. (Usually, two-thirds of the stone is buried.)

• Improved contact permits greater transfer of heat from the tool through the holder.

• **Tests indicate superior wear life. In one grinding test, a 0.15 karat diamond survived 78 passes with a water spray coolant. Other tools never exceeded 45 passes under similar conditions.**

In another test, a 0.25 karat diamond was in good condition after 50 dressings 0.001 in. deep. The 20 in., Norton, silicon wheel (4 in. wide) was mounted in a centerless grinder. More conventionally mounted tools either popped their diamonds or broke down after a few passes.

Additional tests have indicated that moderately sized stones can make 50 cuts, 0.001 in. deep, while dressing a sandwich type wheel in centerless grinders without coolants.

The new diamonds, says Mr. Horn, can also be employed in ceramics, glass, and other types of work.

Predicts Rise in Zinc Use

AUTOS may account for a 17 per cent increase in zinc castings during the 1960s, claims E. C. Quinn, vice president, Sales Div., Chrysler Corp., Detroit.

That is based on predictions for 7 million car sales by 1965, 8 million by 1970.

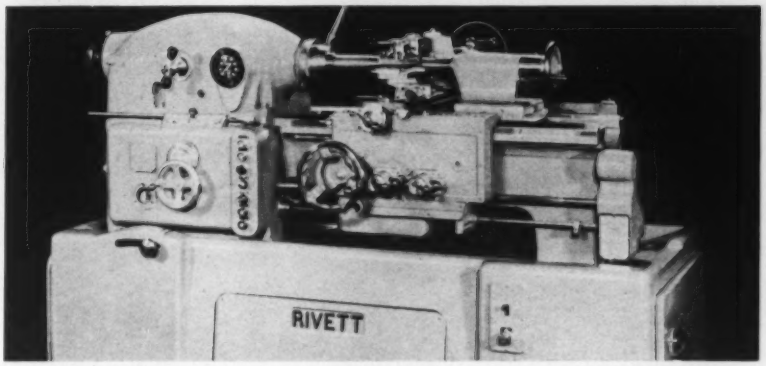
U. S. zinc consumption hasn't kept pace with population growth, he said.

Precise, Quality Work Handled by Lathe Model

NEEDS for extreme precision and quality work can be handled by the Rivett 1020M lathe. The versatile unit can take a ¼ in. cut in cold rolled steel or turn within 0.0004 in. in 12 in.

With a 12½ in. swing, the spindle takes collets up to 1⅛ in. capacity and it's available with 20 or 30 in. centers. Power longitudinal feeds: 0 to 16 in. per minute.

For further information, *write* Rivett Lathe & Grinder Inc., Brighton 35, Boston, Mass.

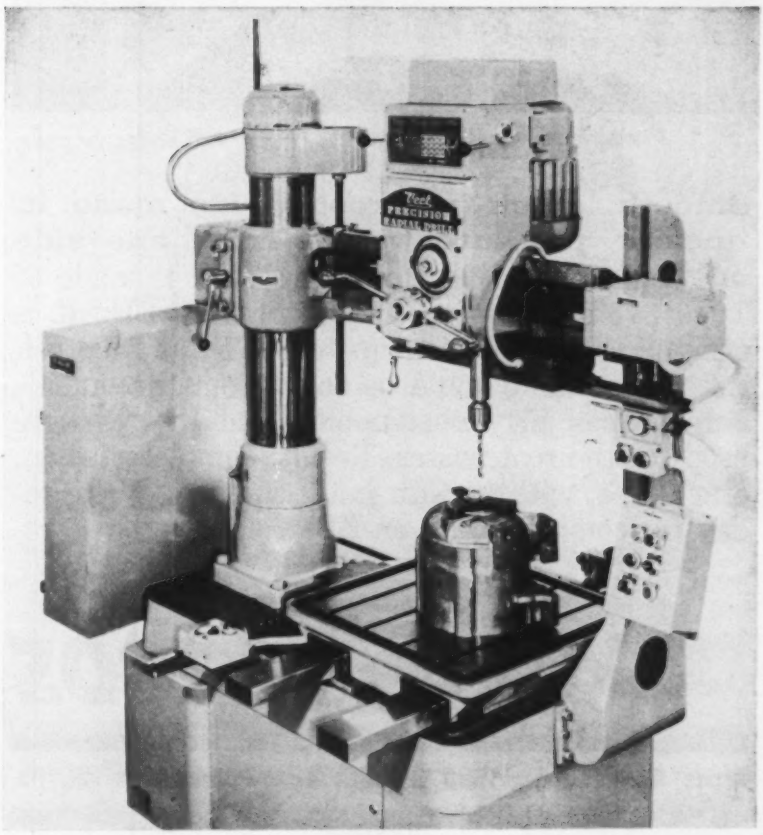


No Layoutwork, Drilling Units Cut Machining Time

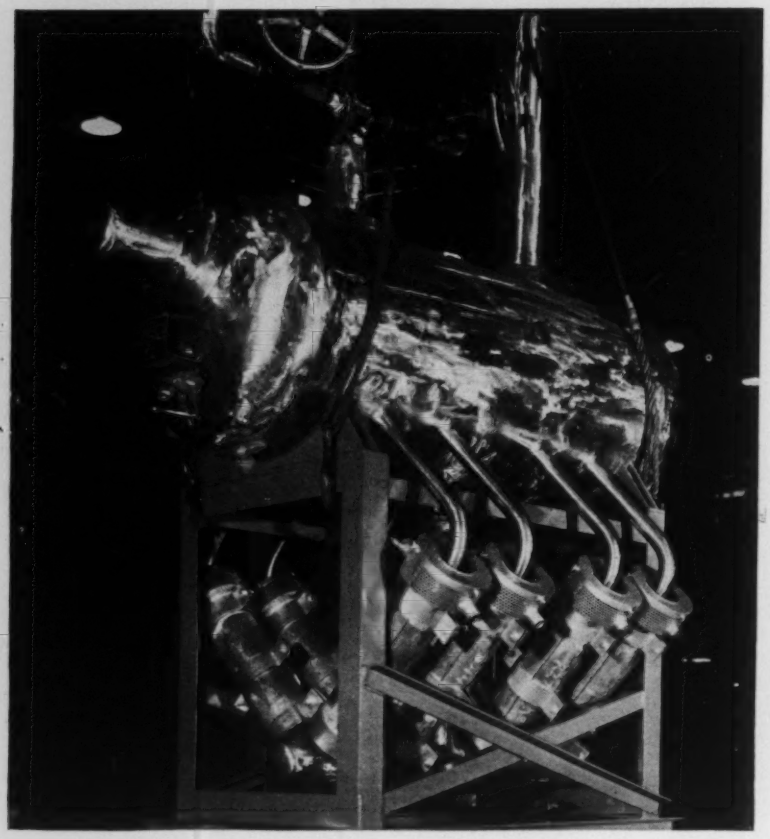
THREE precision drilling machines for low cost automation have been developed by Veet. The Model S semiautomatic is designed for toolroom use to eliminate layoutwork and to cut machining time on single or lots of several pieces where hole locations require accuracy just short of jig bore limits. The company says many jobs can be completely machined in little more than the time ordinarily taken for layout on a surface plate (with holes held to ±0.001 in. of true location). Tape control can be added.

Model T operates from standard, eight channel, 1 in. tape and provides fully automatic positioning. The tape, punched with blueprint location dimensions, is fed into the tape reader to control positioning in both axes from a starting point. Positioning accuracy is ±0.001 in. with repeatability of ±0.0002 in. or less. Model C does the same from prepunched IBM type cards.

The X axis measuring system is built into the arm, traversing the drilling head by servomotor drive with ball screw through a range of 20 in. Spindle runout is less than 0.0002 in. The Y axis measuring system is built into the 25 x 25 in.



ARCOS EB INSERT FOR ROOT PASS WELDING



Job report courtesy of Dominion Bridge Co., Ltd., Montreal, Quebec

Smooth, crack-free root welds made in nuclear pressure vessel from one side only. This NRU reactor surge tank is made of Type 347 stainless, 3" thick with 26" I.D. It is designed for operation up to 630°F. at 2400 psi. Because welding could be done from the outside only, Arcos EB Consumable Weld Inserts were used for the root passes. Result: complete fusion, crack-free, with smooth inner surface. Write today for complete data on EB Weld Inserts.

ARCOS

Arcos Corporation • 1500 S. 50th St. • Philadelphia 43, Pa.

NEW PRODUCTS and equipment

precision table. The table does not overhang its double length, 4 in., wide hardened and ground ways in its 20 in. travel. With rapid traverse of 60 in. per minute, the table quickly positions workloads up to 1000 lb.

The measuring system is independent of the traversing mechanism, ball screws, and drive motors which traverse the head and table. Basis of measuring accuracy is an isometric measuring bar that is calibrated to ten-millionth-inch accuracy. The Veetmatic T with Singer tape control will be shown at the ASTME Exposition in the New York Coliseum, May 22 to 26, in Booth 2135.

For further information, *write* Veet Industries, 25753 Groesbeck Highway, East Detroit, Mich.

Cutters Can Be Preset

PRECISION cutting tools can be preset to the rigidly accurate standards required by continuously operating, numerically controlled equipment on a machine developed by DeVlieg's Microbore Div. It's another step toward the elimination of machine tool downtime for changing cutting tools, the company says.

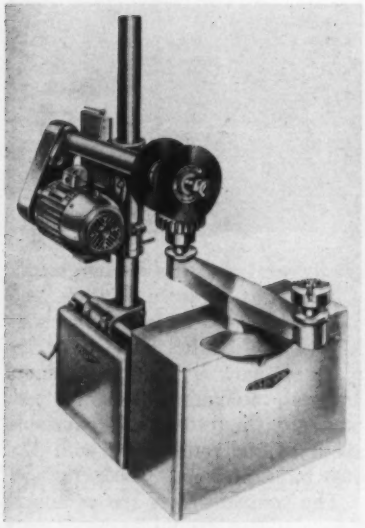
See it at the ASTME Tool Exposition (New York Coliseum, May 22-26, Booth 1314) or *write* Microbore Div., DeVlieg Machine Co., Royal Oak, Mich.

Machine Does Production Deburring, Polishing

A FINISHING machine, the 5224-M1A, does high production deburring, edge blending, surface cleaning, polishing, and buffing.

It has a two spindle indexing workholder and a universal finishing wheel head. The manufacturer says design simplicity makes the unit suitable for job shop or continuous production runs. Major setup adjustments are built in to achieve any compound angle for positioning of the finishing wheel.

On high production runs, the operator can unload and load one spindle while the gear or part on the



other spindle is being deburred or finished.

See it at the ASTME Tool Exposition (New York Coliseum, May 22-26, Booth 2407) or *write* Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland, Ohio.

Tape Punch Can Produce Alpha-Numerical Codes

ALPHA - NUMERICAL coded, punched tapes can be produced on the Model TP-1 tape punch. It takes a standard, eight channel tape, 1 in. wide. All decimal codes plus alphabetic codes S, T, U, W, X, Y, Z, as well as end line (carriage return) and tape feed codes, can be produced on the standard model. Special keyboards can be supplied.

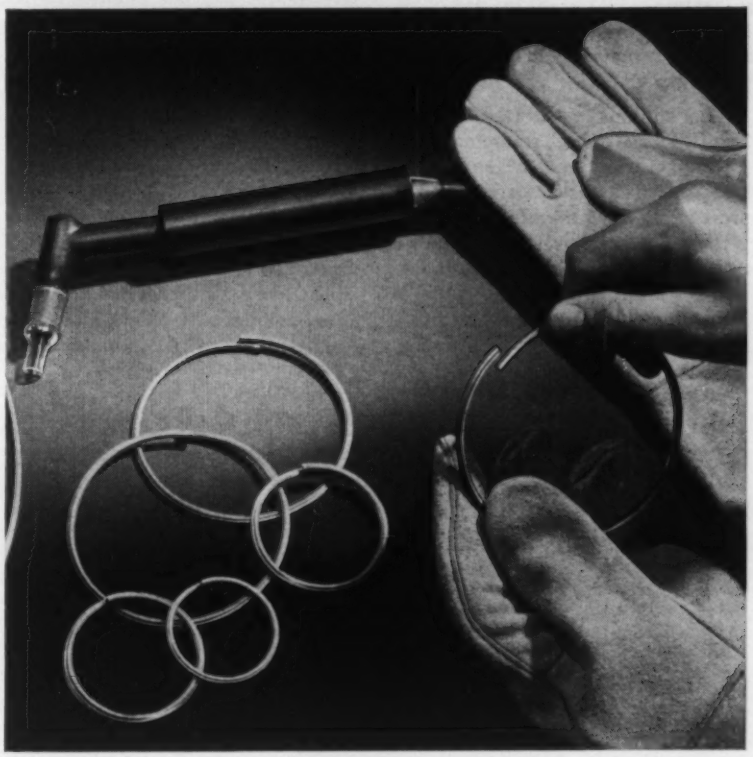
For further information, *write* Carlton Controls Corp., 15 Sagamore Rd., Worcester 5, Mass.

Heavy Duty Stock Reel, Roll Feed Introduced

A HEAVY duty reel and an automatic roll feed have been developed by Cooper Weymouth Inc.

The power driven reel (Model 2500-24MB) handles coil stock up to 2500 lb and can be synchronized with other equipment. Brakes are the electric disc type. Coils are automatically centered and balanced for easy unwinding. Keepers can be rapidly adjusted for fast stock loading. This model is available in 12,

ARCOS EB* INSERT FOR ROOT PASS WELDING



When pipe joints must be completely dependable. The Arcos EB Weld Insert produces smooth, uniform, crevice-free root pass welds that do not cause turbulence or impede liquid flow. It is used for making root passes where accessibility is limited to one side and where highest quality in the root pass is essential to the integrity of the completed weld. A new booklet describing the Arcos EB Weld Insert is yours for the asking. Write for your copy today.

*Registered trademark of the
Electric Boat Division of General Dynamics Corporation

ARCOS

Arcos Corporation • 1500 S. 50th St. • Philadelphia 43, Pa.

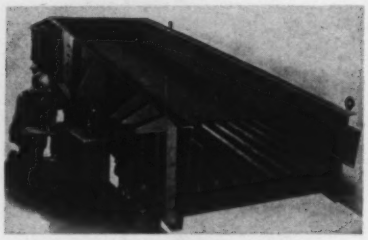
18, and 24 in. stock width sizes with a maximum OD of 40 in., ID of 20 in., and a minimum ID of 15 in. Power is supplied by a 1½ hp, three phase motor.

The automatic roll feed (Model No. RF-6060) boosts stamping press production. Roll feeds automatically feed coil stock at speeds up to 450 press strokes per minute. Operation is by an eccentric hub from the press crankshaft. One simple adjustment changes feed lengths. The unit is available in two types, with direct or compound gearing for feeding extra long sections.

See them at the ASTME Tool Exposition (New York Coliseum, May 22-26, Booth 1239) or *write* Cooper Weymouth Inc., 600 Honeyspot Rd., Stratford, Conn.

Vibrating Feeders Do Controlled Conveying

CONVEYING and feeding of aggregates, ores, and coal can be controlled by Low-Head heavy duty vibrating feeders. A full line is available. The Low-Head has 5 and 10 degree slopes with solid pan deck or partial pan in combination with

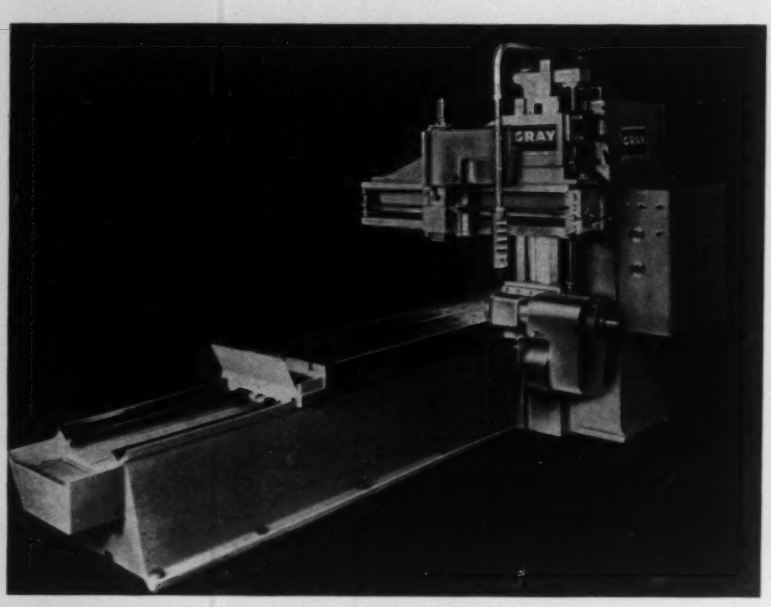


grizzly section at the discharge end.

The units come in 3, 4, 5, and 6 ft widths and in lengths such as 12, 14, or 16 ft. They have replaceable pans and side plate liners and can accommodate large feed. Standard, high torque or variable speed, wound rotor motor with pivoted base can be supplied.

The company says the combination pan and grizzly feeder is particularly suited for removal of fines ahead of crushers or for scalping oversize pieces.

For further information, *write* Allis-Chalmers Mfg. Co., 864 S. 70th St., Milwaukee 1, Wis.



Milling Unit Termed Economy Model

BESIDES everyday shop jobs, the Handymill milling unit is set up to do production work. G. A. Gray calls it a compact, economy model. It's available in 30, 36, and 42 in. sizes and has many features, such as milling heads to which standard attachments may be added. Any combination of rail and side heads is possible.

The milling heads are square locked to the rail on nonmetallic bearing ways. A 10 hp, totally enclosed, fan cooled, ac motor with a cog belt drives the spindle. The two speed, planetary gear system is self-oiled. Eight speeds from 67 to 652 rpm are available.

Large spindle bearings permit heavy cuts with a No. 50 N. S. taper in the nose which is interchangeable with standard, right angle attachments. When both rail and side heads are used, setup time is reduced to a minimum. Table and rail feeds range from 1 to 40 in. per minute over an infinite full range.

For further information, *write* G. A. Gray Co., 3611 Woodburn Ave., Cincinnati 7, Ohio.

Versatile Honing Unit Has Wide Speed Range

A VERSATILE honing machine introduced by Sunnen has a wide range of easy-to-select spindle speeds. A double reduction belt drive delivers full power from a ½ hp motor to the spindle at all operating speeds.

The company says the honing unit can handle honing applications on 0.100 to 2.625 in. bores with standard tooling available from stock. Bores to 5.500 in. can also be honed with tooling built to order.

See it at the ASTME Tool Exposition (New York Coliseum, May 22-26, Booth 1515) or *write* Dept. H-44, Sunnen Products Co., 7910 Manchester Ave., St. Louis 17, Mo.

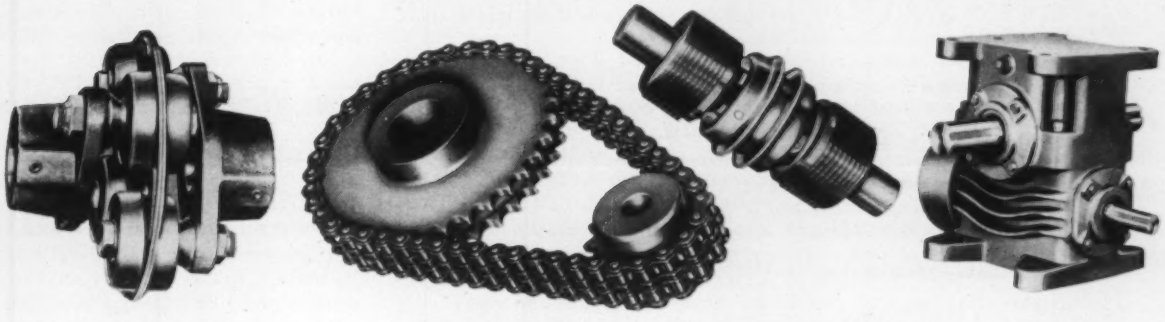
Saws Cut Ferrous and Nonferrous Metals

FERROUS and nonferrous metals can be cut at speeds up to 140 (5 in.) strokes per minute on the 66W2A (two speed) and 66W4A (four speed) automatic cutting machines. Capacity is 6 x 6 in. (actual 6⅝ in. diameter).

The units use a combination of

Morse has an answer to every industrial drive problem under the sun

Basic Drives, Speed Reducers, Couplings, Clutches—only Morse makes all four and only Morse stocks all four. For example, if your industrial drive problem involves basic drives such as roller chain, silent chain, and Hy-Vo® Drives, or "Timing"® belts, friction clutches, and couplings, too, look to Morse for the answer. You'll get impartial engineering help and immediate delivery.



As for quality, Morse products speak for themselves: Morse timing chain is original equipment in over 76% of American cars. So whatever your industrial drive problem, see your Morse man. He's in the Yellow Pages. Or write: Morse Chain Co., Dept. 2-51, Ithaca, N.Y. Export Sales: Borg-Warner International, Chicago 3, Ill. In Canada: Morse Chain of Canada, Ltd., Simcoe, Ont.

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B-W

Want to strip "unstrippable" coating?

ask Oakite

OVER 50 YEARS CLEANING EXPERIENCE • OVER 250 SERVICE MEN • OVER 160 MATERIALS

Even tough EPOXY FINISHES peel off in Oakite STRIPPER S-A

Burn off an epoxy finish from a reject as a last resort? Not at all necessary. Oakite STRIPPER S-A strips metals clean. That's true for multiple coats as well as single coat epoxy finishes. Look at STRIPPER S-A's record:

- *A 3/16" thick coating built up from layers of epoxy coating and wrappings of fiber glass was stripped from gun barrels by overnight soak in Stripper S-A. Everything tried previously had failed.*
- *Brass plated steel parts were stripped of their epoxy finish in matter of minutes.*
- *Workholding spindles and racks laden with at least 10 coats were stripped to bare metal by a short soak. Paint hooks formerly burned clean are now soaked clean instead.*

This powerful stripper is safe for all metals except zinc and magnesium. And it's safe to the user, since it works cold . . . has no flash point . . . rinses with water.

STRIPPER S-A is but one of a long list of superior strippers by Oakite. Some are specially formulated for use on steel . . . aluminum . . . other metals. Some for removing lacquers . . . tough synthetic finishes. Still others are designed especially for removing paint from vertical surfaces. Whatever your paint-stripping problem—Oakite is bound to have the answer. Ask your local Oakite man or send for paint-stripping bulletin F-7893. Oakite Products, Inc., 34E Rector Street, New York 6, N. Y.

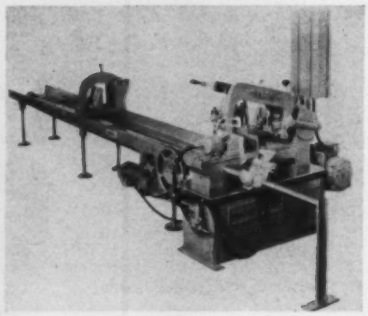
it PAYS to ask Oakite

OAKITE.

over 50 years' leadership in industrial cleaning

Est. 1909 SCIENCE

NEW PRODUCTS and equipment



hydraulics, electricity, and pneumatics for production efficiency. The length gage incorporates a fine micrometer screw adjustment that can be set quickly to hold lengths within 0.005 in.

Minimum quantities of five or ten pieces as well as much greater quantities can be cut automatically at operating savings because of the short setup time.

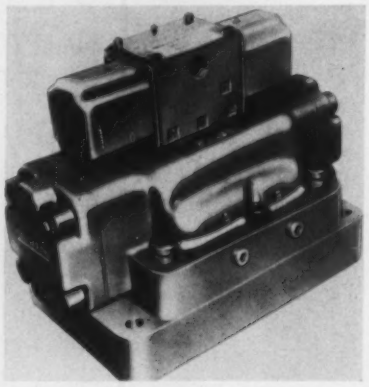
An accurately controlled hydraulic blade feed permits fast, straight cuts. The work is held by air chucks.

For further information, *write* Racine Hydraulics & Machinery Inc., 2000 Albert St., Racine, Wis.

Four Way Valve Takes Pressures to 5000 psi

OPERATING pressures to 5000 psi can be maintained with the Denison 1½ in., four way valve. It can be manually, mechanically, or electrically operated. Design is similar to the ¾ in. line made by the company.

The valve is available as a thread, subplate, or flange connected unit. Five different spools provide for



open, closed, or partially blocked flow path connections at flows up to 90 gpm.

For further information, *write* Denison Engineering Div., American Brake Shoe Co., 1160 Dublin Rd., Columbus, Ohio.

Precipitator Removes Oil Mist from Atmosphere

HIGH EFFICIENCY, easy installation, and mounting flexibility are features of an oil mist precipitator called the Trion OMP.

The company claims several advantages when used with grinding operations: 1. Cleaner, healthier air. 2. Lower heating and cooling cost (air can be recirculated rather than discharged from the building). 3. Increased production (smoke and mist control makes possible higher cutting speeds, better quality, and fewer rejects). 4. Reduced maintenance costs (oily mist is prevented from gathering on equipment, walls, lighting fixtures).

The unit can be mounted on the grinding machine or it can be remotely located. Three sizes are available (300, 600, and 1200 cfm). Mechanical and electronic techniques remove the contaminants.

For further information, *write* Trion Inc., McKees Rocks, Pa.

Stroke on Automatic Threading Lathe 80 in.

THREADING of a 6½ ft lead screw can be done in less than ½ hour on the Model 3L automatic cycle threading lathe. The extra long machine has an 80 in. stroke, 84 in. between centers.

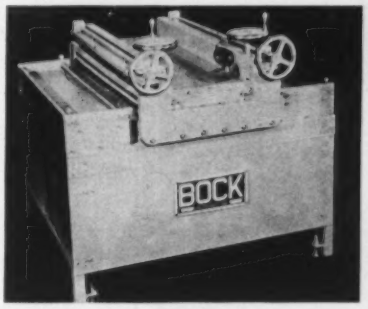
It's capable of automatically threading internally and externally by a series of passes in which the spindle speeds, feeds, and number of passes are preselected. When the cycle is complete, the machine stops automatically. Spindle bores up to 16 in. and swings up to 24 in. are available with the unit. With additional attachments, tracing, facing, turning, cutoff, chamfering, shouldering, boring, and threading are possible in a single chucking operation.

See it at the ASTME Tool Exhibition (New York Coliseum, May 22-26, Booth 2446) or *write* Man-Au-Cycle Corp. of America, 132 53rd St., Brooklyn 32, N. Y.

Roller Leveler Handles Widths up to 48 in.

A ROLLER leveler for handling uncoiled steel in widths up to 48 in. and thicknesses up to 16 gage has been introduced by Elkhart.

The unit has a total of 11 rolls (seven for straightening, four pinch) and has a 60 ft per minute maximum speed. It's driven by a 1 hp, 110-120 volt, gear head motor. Moving parts are guard covered and needle bearings are used throughout. Standard models take 36 and 48 in. wide steel.



For further information, *write* Elkhart Welding & Boiler Works Inc., 2132 S. Main St., Elkhart, Ind.

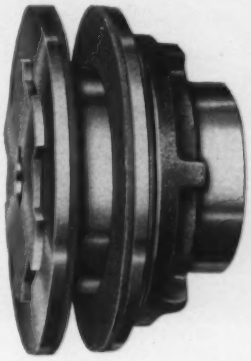
Punch Press Equipped with Quick Change Transmission

FEATURES of the Kenco Kompac punch press include a totally enclosed and easily accessible flywheel, crankshaft, connection rod, and ram; rear mounted flywheel; and a self-contained interchangeable power transmission unit which is available in various stroke lengths from ¼ to 2 in.

The power transmission unit can be changed in minutes by merely removing four bolts, disconnecting the ram and flywheel, and slipping another unit into position.

A shorter crankshaft, fewer moving parts, and reduced friction have cut the starting and stopping load 75 per cent, says Kenco. A ⅓ hp, 1750 rpm motor and an electrical

A Morse answer



Torque limiters

...when the problem involves automatic overload protection

Protect expensive equipment

Eliminate shear pins

Lessen costly downtime

Adaptable to any drive

Easily adjusted

Controlled torque setting

Capacities: 10 to 6300 ft.-lbs.

Clutch sizes: 3 to 20 inches

Distributor-stocked

Got a clutch problem? Call your Morse distributor. He's listed in the Yellow Pages.

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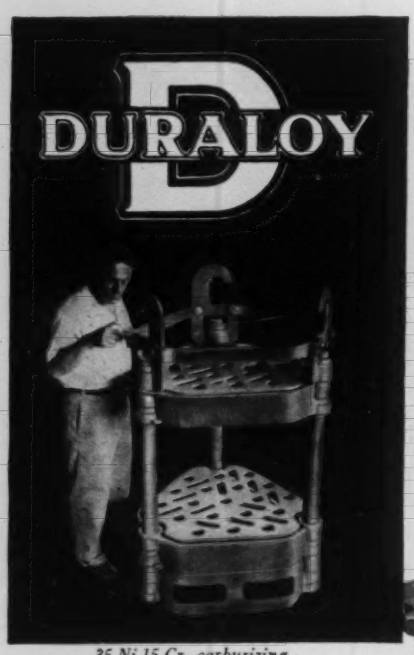
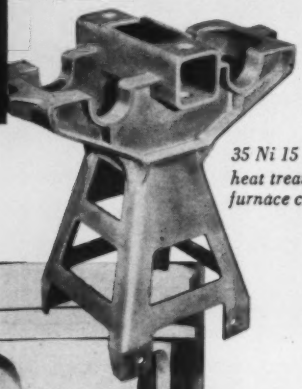
Morse Chain Co., Dept. 2-51, Ithaca, N.Y. Export Sales: Borg-Warner International, Chicago 3, Ill. In Canada: Morse Chain of Canada, Ltd., Simcoe, Ont.



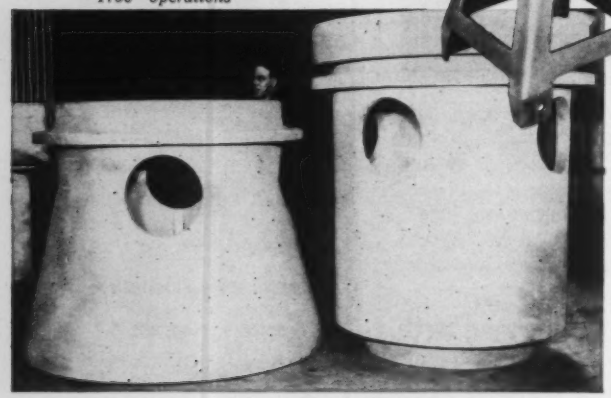
High Alloy CASTINGS for METAL TREATING

35 Ni 15 Cr carburizing furnace casting



35 Ni 15 Cr heat treating furnace casting

Heat treating stools for 1750° operations



● ***Sound castings to withstand the high operating temperatures and wide temperature ranges without deformation.***

Nickel-chrome castings have long been the 'standard' for heat treating and annealing operations—and for close to forty years Duraloy castings have been considered by many metal working plants to be the 'standard' for meeting the industry's sound casting requirements.

The three Duraloy castings illustrated typify the kind of work we do for the metal treating plants.

We're in a position to cast any shape or size and of any alloy to meet your requirements. Send for Bulletin G-159.

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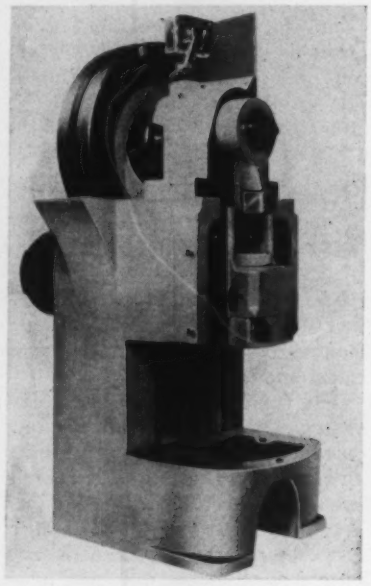


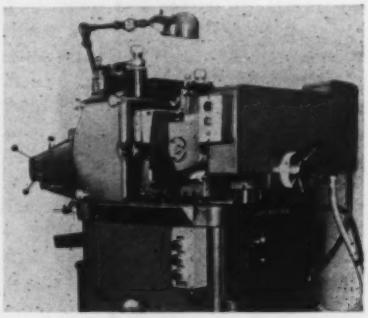
foot or hand control switch are included with the press.

For further information, *write* Kenco Mfg. Co., 5211 Telegraph Rd., Los Angeles 22, Calif.

Centerless Grinder Has Fast, Automatic Cycling

HIGH SPEED, automatic cycling with positive repeating action is a highlight of the Model CG-12-A, high precision, centerless grinder. Manual operation is also possible.

For safety, it can be returned to the open position at any stage of the grinding operation by pressing a button. It can grind multidiameter parts as well as balls out of stainless or carbon steel, glass, or plastic. It also grinds wood, nonferrous metals, fiber, hard rubber, ceramics, and cork.



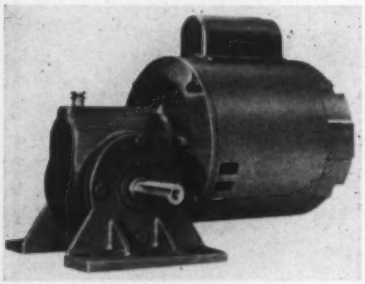
Special characteristics of the 30 x 54 in. unit include high output and fast checking with both sides of the wheel accessible from operating position, hydraulically or manually operated wheel dressers, and a caster mounted coolant tank.

For further information, *write* Royal Master Grinders Inc., 272 Highway 23, Riverdale, N. J.

Right Angle Gear Motors Are Smaller, Lighter

WEIGHT reduction, smaller size, and a reversible outputshaft are featured in the Master gear motor line. The ¼ hp unit weighs 26 lb (20 lb lighter than the present unit).

With the reversible outputshaft, the user can transfer the shaft to the righthand or lefthand side of the gear unit in the field. Interchangeable bearing housing plates on either side of the gear head are easily removed.

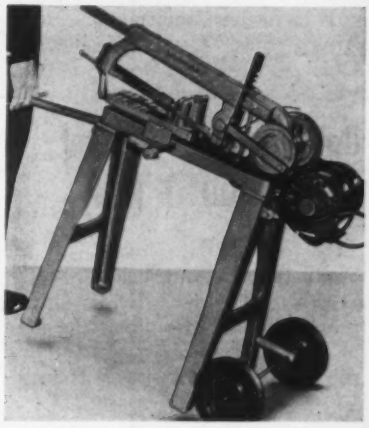


The cast iron gear case has an integrally cast end shield for mounting the footless Duty Master ac motor. The unit is available in ⅛, 1/6, ¼, and ⅓ hp ratings in dripproof, total, and fan cooled enclosures. Thirteen reduction ratios are standard and dimensions are identical for all units.

For further information, *write* Reliance Electric & Engineering Co., 24701 Euclid Ave., Cleveland 17, Ohio.

Power Hacksaw Cuts Angles

A FLOOR MODEL, power hacksaw (Jefferson 601) has been added to the Keller line. Saw capacity is 5 in. wide by 4 in. deep with a fast acting swivel vise that permits sawing any angle to 45 degrees on material up to 3¼ in. wide. The



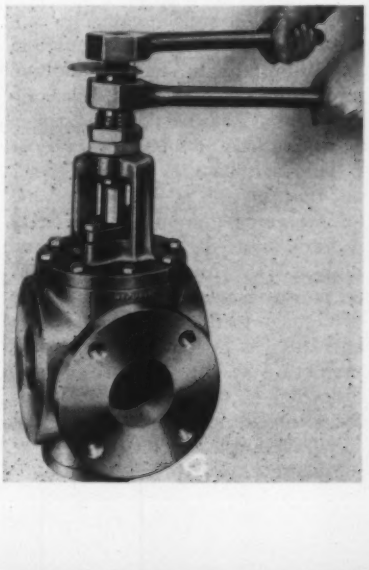
unit feeds by gravity. A length gage bar permits cutting uniform lengths.

Pressure is relieved on the back stroke to prolong blade life. The saw stroke is 3¾ in. and 10 or 12 in. blades may be used. A ¼ hp, 1725 rpm motor is included. An automatic stop switch lets the saw operate unattended. A handle at the front of the unit and wheels on the rear legs make the unit easily portable.

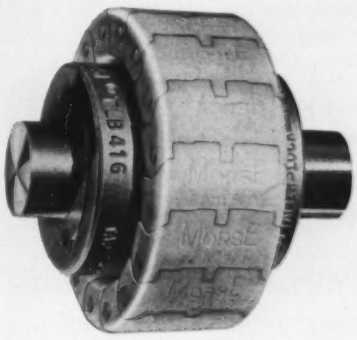
For further information, *write* Sales Service Mfg. Co., 2363 University Ave., St. Paul 14, Minn.

Valve Handles Suspended Solids, Abrasive Slurries

ABRASIVE slurries and solids in suspension (cement, sand, coal, food products, plant waste, and chemical sludges) and oil, gases, and chemicals are efficiently handled by a



A Morse answer



Nylon couplings

... when the problem involves corrosion, cost, lubrication

Corrosion-resistant

Cost 20% less

Lubrication-free

Safety first

Easy disassembly

Standard stock sprockets

Fractional to 40-hp. loads

Speeds up to 5,000 rpm.

Distributor-stocked

Got a coupling problem? Call your Morse distributor. He's listed in the Yellow Pages.

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BW

Morse Chain Co., Dept. 2-51, Ithaca, N.Y. Export Sales: Borg-Warner International, Chicago 3, Ill. In Canada: Morse Chain of Canada, Ltd., Simcoe, Ont.

Republic tapered plug valve.

The valve provides a rubber to metal seal. No lubricant is used and the company says routine servicing is not required. It's designed for continuous working pressure up to 200 psi. Sudden pressure build-ups to 900 psi do not affect the valve, says the company. The valve is made in the 3 in. size in two, three, and four way types.

For further information, *write* Republic Mfg. Co., 15655 Brookpark Rd., Cleveland 35, Ohio.

Neoprene Contact Adhesive Bonds Many Materials

AN ADHESIVE called D-239 is a general purpose, neoprene contact type suitable for bonding a wide variety of materials. Bonds have high peel strength, remain permanently strong and resilient, and have good water resistance.

Jobs: It can bond supported vinyl fabrics to metal, wood, and composition bases; thin gage metals or foils to wood; cement asbestos board, hardboard, and composition bases; and fabric backed urethane sheets (such as Armstrong PO-663) to metal, wood, and composition bases.

The adhesive is a yellow, air drying solvent adhesive with a synthetic rubber base. It has a consistency of thin syrup and may be applied by brush, spray, or roller coater.

For further information, *write* Industrial Div., Armstrong Cork Co., Lancaster, Pa.

Zinc Coated Steel Has Good Paintability

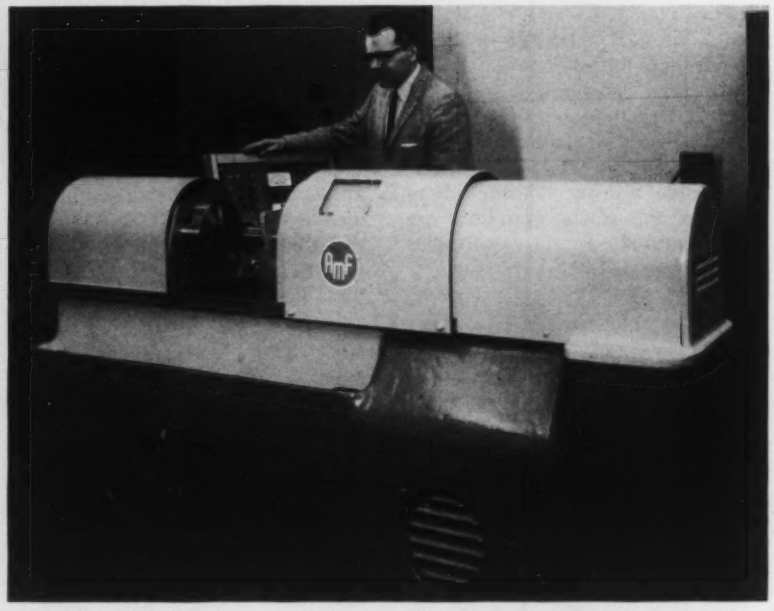
SUPERIOR paintability and welding properties are claimed by Logan T. Johnston, president, for Armco's zinc coated steel. The product, called Zincgrip A, Paintgrip, has immediate applications in the automotive, appliance, sign, architectural, heating and air conditioning, and farm markets, says Mr. Johnston.

For further information, *write* Armco Steel Corp., Middletown, Ohio.

Rotating Bellows Seal Resists 800° F Heat

THE WORKING range of the Sealol 605, rotating bellows seal is −350 to 800° F. Every unit is pressure balanced without the need of sleeves or special steps cut into the shaft and stock sizes will accept pressures to 300 psi. The use of dynamic elastomers has been eliminated. Sealing of the drive collar to the shaft is accomplished by a metallic gasket or an O-ring. The seal is simply designed. Bellows core and two welded fittings rotate as a single unit. The mating ring (against which the carbon ring runs) is stationary. There are no loose parts, critical fits, or sliding elements, says Sealol.

For further information, *write* Sealol Inc., 100 Post Rd., Providence, R. I.



Unit Friction Welds Many Materials

THIS friction welder can join copper to brass, brass to aluminum, and aluminum to steel, in addition to ceramics, plastics, and other combinations. It's particularly suited to joining bars or tubes.

The manufacturer (AMF) points out that the unit is efficient and has low power requirements. Friction welding uses light pressures and high speeds. Another bonus: Lower pressures mean less deformation or damage to the unwelded sections and there is less chance for cracks, premature seizing, overstressing, or distortion of work. In many cases, friction welding eliminates the need for fluxes and special gaseous atmospheres, says AMF.

This friction welder holds one object fast while the other is rotated and pressed against the first. After a specified period of time, rotation is stopped and pressure is increased and held for another specified period. To weld high alloy to low carbon steel, the rotating element spins at about 12,000 rpm. The rotating section contacts the static section and pressure is gradually built up. After metal at the point of contact becomes molten, the motion is stopped, pressure is increased and held until the parts cool.

For further information, *write* Research & Development Div., American Machine & Foundry Co., 689 Hope St., Springdale, Conn.

NEW literature

Write directly to the company for a copy

Lift Truck Safety Kit

A pocket sized Lift Truck Operator's Guide, four humorous safety cartoons for bulletin boards, and four lift truck route posters printed in bold letters are contained in a kit. The guide emphasizes proper lift truck use. Towmotor Corp., 16100 Euclid Ave., Cleveland 12, Ohio.

Conveyor Data

Applications and case histories on Logan conveyors are listed in a 40 page brochure. Logan Co., Louisville, Ky.

Testing of Relays

A detailed technical paper by T. L. Bourbonnais II entitled "The Co-ordination and Testing of Protective Relays in Industrial Plants" includes an explanation of such equipment in plants of E. I. du Pont de Nemours & Co. Inc. Multi-Amp Electronic Corp., 465 Lehigh Ave., Union, N. J.

Glass, Glass-Ceramics

A 68 page illustrated booklet presents a comprehensive story of glass and glass-ceramics. It reviews the history of glass and details basic types. A two page chart gives properties of selected glasses and glass-ceramics. Corning Glass Works, Corning, N. Y.

Tool Steel Trends

Basic information on the use, application, and fabrication of tool steel is covered in a booklet. Issues will be published every three or four months. Committee of Tool Steel Producers, American Iron & Steel Institute, 150 E. 42nd St., New York 17, N. Y.

Better Bolting

How to take the guesswork out of bolted assemblies is explained in a four page folder. It also tells how to assure maximum clamping force from threaded fasteners and eliminate bolt failures caused by substandard tightening, outlines the importance of accurate torque-tension relationships to fastener efficiency, and explains why torque in itself is not a reliable measure of fastener holding power. Skidmore-Wilhelm Mfg. Co., 442 S. Green Rd., Cleveland 21, Ohio.

American Standards

The 1961 Catalog of American Standards (which now number 1973) contains a listing of special publications in the standardization field, pamphlets and standards recommendations of the International Organization for Standardization and the International Electrotechnical Commission. It also has an index to titles of American Standards and international recommendations. Dept. PR 214, American Standards Association, 10 E. 40th St., New York 16, N. Y.

Dust Spot Test

A handy reference sheet explains why the soiling effect of air is a useful index to dust content and how the index is used to determine the efficiency of air cleaners in the U. S. Bureau of Standards dust spot test. Specify Bulletin B-5210. Sturtevant Div., Westinghouse Electric Corp., Damon St., Hyde Park, Boston 36, Mass.

NEW BOOKS

Federal Agencies Financing Research, third edition, Social Legislation Information Service Inc., Dupont Circle Bldg., Washington 6, D. C., 26 pages, $1

This booklet is designed to help persons or companies hoping to work on government research projects. It provides information on the programs, procedures, and organization of each U. S. agency awarding such contracts, as well as the officer to approach for further specifics.

The Machining of Steel, F. C. Lea and Eric N. Simons, published by Odhams Press Ltd., Long Acre, London, England; distributed by Macmillan Co., 60 Fifth Ave., New York 11, N. Y., 208 pages, $5

The volume presents in simple and concise style the fundamental principles of cutting and shaping steel and its alloys, together with practical information on machines and methods used. Chapters cover turning, planing, shaping, milling, drilling, broaching, reaming, sawing, and electrospark cutting. Grinding is not covered.

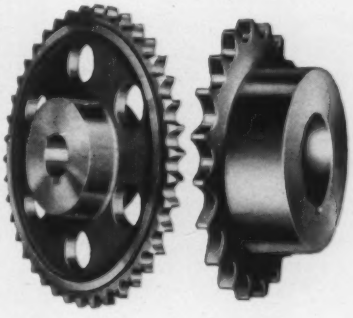
Zone Refining and Allied Techniques, N. L. Parr, St. Martin's Press Inc., 175 Fifth Ave., New York 10, N. Y., 184 pages, $8.50

Methods are covered and practical information on advances in laboratory methods and equipment is provided. One of the objects of the volume is to encourage a wider application of the process to fields of research and industry other than transistor development. It discusses a wide range of equipment, ranging from inexpensive, easily constructed apparatus to carefully designed and specially constructed complex installations for high precision production.

Temperature Measurement and Control, W. F. Coxon, Macmillan Co., 60 Fifth Ave., New York 11, N. Y., 314 pages, $12

This volume is intended as an introduction to the problems of temperature measurement and control. Much of the theoretical mathematics associated with temperature considerations has been omitted. The early chapters present basic physical data briefly and the remainder of the book is given over to a discussion of instruments and control methods. Typical instruments are described and their practical use is explained.

A Morse answer



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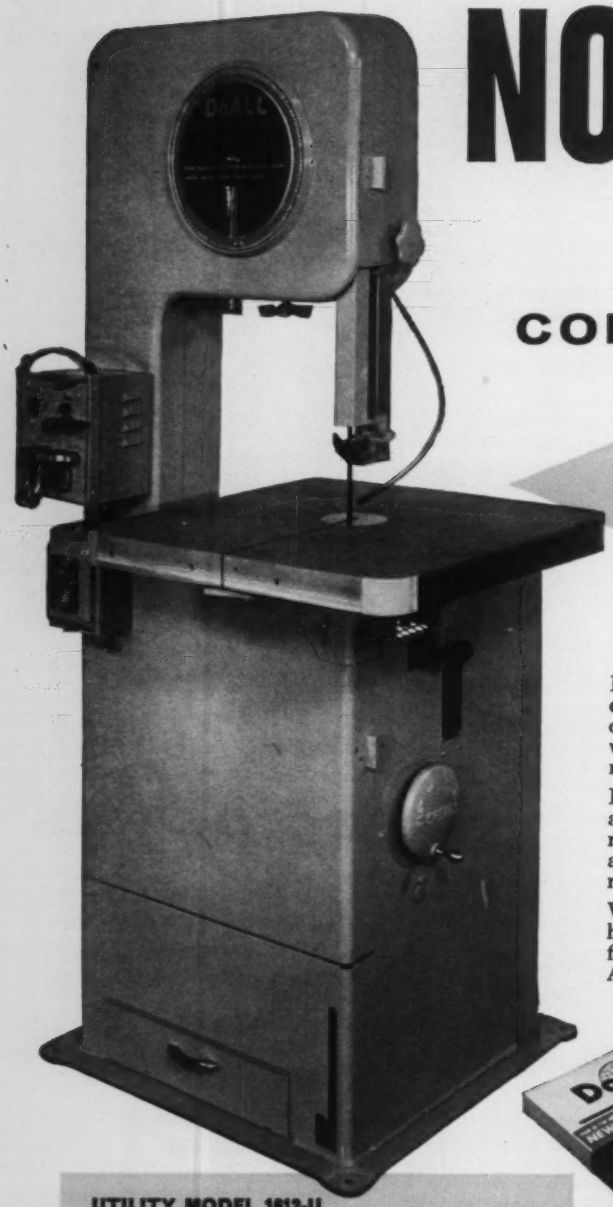

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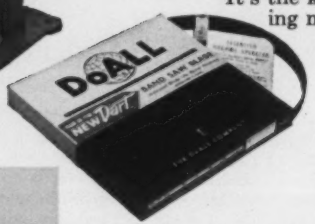

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Steel Consumption Rebounds

STEEL CONSUMPTION bottomed out in the first quarter, will reach its highest level since the recession in the second quarter, and will taper off only slightly during the summer.

That's what market analysts are saying as they update previous forecasts. They believe first quarter consumption of finished steel products was only 15.1 million tons—about 2 million tons less than users consumed during the fourth quarter of last year. They expect second quarter consumption to jump 18.5 per cent (to 17.9 million tons) and third quarter consumption to drop only 4 per cent (to 17.2 million tons).

LIQUIDATION ENDS— During last year's fourth quarter, users cut their inventories by about 3.5 million tons. They ended the year with stocks of about 10.3 million. During the first quarter, they continued liquidating—but at a slower rate. Their stocks fell to a low of about 9 million tons. There's a good chance that they'll rise a little by the quarter's end.

TREND INTERPRETED — Since inventory levels are meaningful only when they are related to consumption rates, marketing men normally view finished steel stocks in terms of days of supply. Here's one company's estimate of inventories by quarters: End of first quarter, 1960, 87 days; end of second quarter, 82 days; end of third quarter, 73; end of fourth quarter, 61; end of first quarter, 1961, 46 days; end of second quarter, 52; and end of third quarter, 53. The belief that inventories bottomed out at a 45 day level at the end of the first quarter is confirmed by STEEL's latest survey (May 1, p. 82).

HAND-TO-MOUTH BUYING—As consumption picks up, users are ordering more steel, but they're trying to hold their inventories at or below the 45 day level. Thus far, the mills have had no trouble keeping delivery promises short on anything but galvanized sheets and tin plate. (Some producers are sold out for two months on those products.) Buying for immediate needs is still the rule on most items.

INVENTORIES TO RISE—Although consumption is up sharply this quarter, it may not equal the amount of steel that users will receive from U. S. and foreign mills. Inventories may climb by as much as 500,000 tons. A large part of the increase will reflect tin plate stockpiling by can companies prior to heavy consumption in the third quarter. In addition, there may be some rebuilding of mill inventories. The flood of May orders caught most steelmakers by surprise, forcing them to ship substantial tonnages from inventory. They're likely to rebuild their stocks to some extent during the second and third quarters.

SERVICE CENTER TURNABOUT—Since last July, service center inventories have dropped by about 1 million tons. On Apr. 1, they were estimated at 2,850,000 tons. Since then, they've bottomed out and may have increased slightly. Distributors' daily shipments averaged 5 to 10 per cent higher in April than in March, and the uptrend seems to be continuing. For the first time this year, members of the Steel Service Center Institute report that their daily sales are running ahead of year-ago levels.

OUTPUT CLIMBING—Look for ingot production in the week ending May 20 to exceed the 2 million tons that STEEL estimates the industry poured in the week ended May 13. Output then was up 3 per cent from the previous week's. STEEL estimates industry operations at 70 per cent of 1961 capacity.

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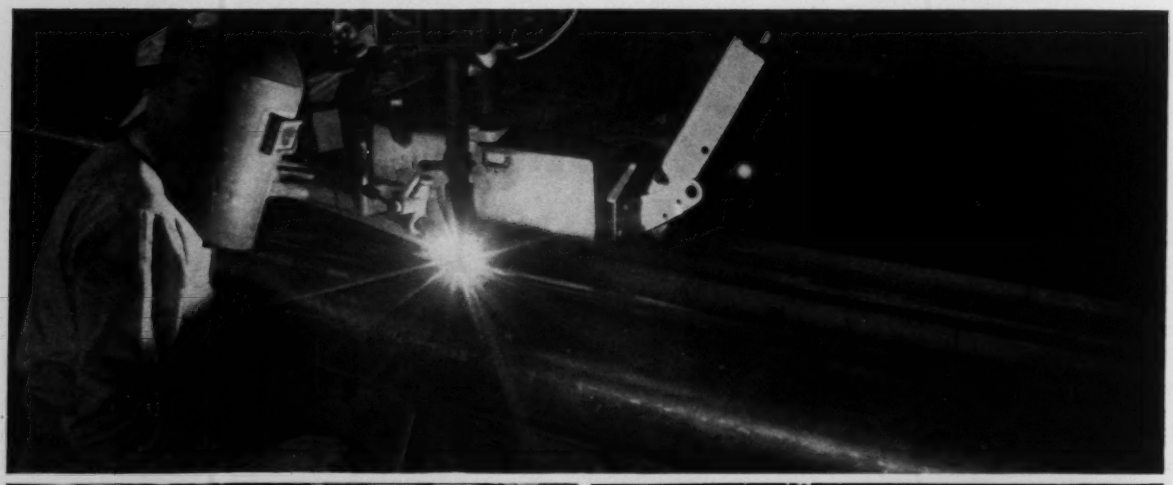
*Current prices were published in the May 8 issue and will appear in subsequent issues.

Weldability and formability of 90-10 Cupro Nickel are keys to durable salt water piping at moderate cost



Top: A 15-foot section of 12″ diameter salt water piping fabricated from sheet Cupro Nickel, 10%-755 being welded at Welin Davit & Boat Division. **Left above:** A 4″ diameter section of Cupro Nickel piping, first formed oval, is made perfectly round in this forming die. **Right above:** In a new mechanized setup, specially developed by Welin Davit for smaller tubes, a 4″ diameter tube seam is welded by the TIG process using automatic filler wire feed.

Steadily growing use of 90-10 Cupro Nickel piping in marine, power plant and industrial applications – for salt water fire mains and cooling lines, even fuel lines – is due to a combination of several advantages: required corrosion resistance at moderate cost, ready formability, and good weldability.

Tube section pressed flat at weld shows no breaks or cracks. This test demonstrates quality of welds achieved. All 70-30 and 90-10 Cupro Nickel piping made at Welin Davit meets Specification MIL-T-16420F (SHIPS), July 1960.

Outstanding corrosion and erosion resistance of 90-10 Cupro Nickel salt water piping assures long, trouble-free service life, even at relatively high rates of flow. Higher strength of 90-10 Cupro Nickel permits use of lighter wall thicknesses than are required for copper and results in significant weight savings.

All this adds up to economy in fabrication . . . ease in installation . . . and minimum maintenance – less cost overall!

The Welin Davit & Boat Div. of Continental Copper & Steel Industries, Inc., Perth Amboy, N. J., whose name is synonymous with lifeboats and davits, has enlarged its facilities to meet the growing demand for piping of 90-10 Cupro Nickel alloy–which provides, to a high degree, the advantages of 70-30 Cupro Nickel at relatively moderate cost. It produces the piping from sheet and strip in lengths up to 15′ and in diameters from 4″ to 15″ O.D. Wall thicknesses range from .095″ to .500″ depending on the service and diameter.

FOR TECHNICAL ASSISTANCE in the selection of the best alloy to do a job, and in the welding or joining of copper and copper alloys, see your Anaconda representative. Or write: Anaconda American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass, Ltd., New Toronto, Ont. 6184

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Aluminum Coated Wire: Big Potential

EVER SINCE wiremaking was revolutionized by Charles Hill Morgan's development of the continuous rod mill some 90 years ago, production has grown in step with the nation's emergence from an economy of farms to one of factories.

One of the most powerful influences in the industrialization of this country, wire finds more diversified applications in the U. S. economy than any other product of the steel industry. Today, more than 90,000 separate wire items, each designed for specific applications, are available from the mills, and additions are constantly being made to the list of items offered by producers as new uses are uncovered.

• **Wider Application**—Among important recent developments is increasing utilization of aluminum covered and aluminized wire (the latter term generally applying to wire coated with aluminum by some form of the hot dip process). Acceptance of these relatively specialized wire products in a wide variety of applications is growing rapidly. Some wiremen say the market potential is almost unlimited, particularly where corrosion resistance is a major consideration.

Present usage includes farm items, such as barbed wire and field fence; wire for communications and electrical transmission (aluminum cable steel reinforced core wire, for example); messenger strand to support conductors and telephone cables, guy strand for poles, smokestacks, and other structures; overhead ground or static wire for protecting electrical transmission lines from lightning; and miscellaneous applications such as market baskets, broom wire, netting, paper clips, spiral binding, tie wire, welding wire, animal cage wire, high temperature woven wire belting, piston inserts, and chain link fence.

• **Several Methods**—Modern technology has overcome many of the operational problems long associated with the bonding of aluminum with other metals. Today, aluminum coatings are applied by a number of methods: Spraying, cementation, hot dipping, cladding, casting, electroplating, and vapor phase deposition. Patented modifications of the hot dip process are most commonly used in covering steel wire with aluminum. One large manufacturer of core and electrical transmission wire uses a method that involves continuous application of aluminum powder onto a high strength steel rod. Powder metallurgy techniques refine the cladding to produce a bimetallic rod which is then cold drawn to finished wire sizes. The technique is referred to as the controlled atomic-weld process.

Where the hot dip process is used, the aluminum bath is main-

tained at 1225 to 1250° F, a temperature that's sufficient to soften carbon steels with corresponding loss in tensile strength. However, aluminum coated wire can be cold drawn after coating to improve or raise the tensile strength. Also, by drawing after coating, bright finishes can be produced which make the wire suitable for decorative purposes.

• **Few Producers**—The number of producers is small at present, but many other wiremakers, particularly those producing galvanized wire, are showing interest in the aluminum coated product. Leading producers, all of whom sell their products under specific tradenames, include: American Steel & Wire Div., Joliet, Ill., U. S. Steel Corp.; Bethlehem Steel Co., Johnstown and Williamsport, Pa.; Copperweld Steel Co., Glassport, Pa.; National Standard Co., Niles, Mich.; Kaiser Aluminum & Chemical Corp., Oakland, Calif.; Olin, New York; Page Steel & Wire Div., Monessen, Pa., American Chain & Cable Co.; Sheffield Steel Div., Kansas City, Mo., Armco Steel Corp. There are also a number of firms that purchase aluminum coated wire and process it further before it reaches the market.

Aluminum coated wire is competitive with other grades of wire in corrosion resistance applications. It's available in a broad range of sizes. For example, one maker offers sizes from 0.204 to 0.080 in., and 3-wire, 7-wire, 19-wire, and 37-wire strands. Another producer says a representative size range would be 0.050 to 0.200 in. in the "as aluminized" condition, and 0.010 to 0.100 in the drawn aluminized condition.

• **Pricing Methods**—Different manufacturers have different methods for pricing aluminum covered wire. Solid wire is sold by the pound, while strand is priced per 1000 feet. Generally, aluminum covered wire is quoted about 10 per cent above the price on galvanized wire. For example, the base price of galvanized core wire is $12.65 per 100 pounds, to which must be added a zinc differential that fluctuates with the price of zinc. The base price for aluminized wire is $14.15, with no addition for aluminum.

In the case of manufacturers' wire and merchant wire, which do not take a commodity price, there is an extra charge for aluminizing, which charge varies with the gage, as does the extra for galvanizing. For example, No. 1 gage wire, Type 3 galvanized, carries an extra of $2.70 per 100 pounds, to which must be added the zinc differential of 30 cents based on the present price of zinc. The comparable aluminizing extra is $4.425, with no addition for aluminum. Similar figures for wire drawn after coating would be $3.60 for galvanized, and $5.025 for aluminized.

Stainless Steel . . .

Stainless Steel Prices, Page 181

Production of stainless and heat resisting steel ingots (excluding tool steel grades) in the first quarter of this year totaled 232,379 net tons, reports the American Iron & Steel Institute. In the last quarter of 1960, output was 206,470 tons. In the first three months of last year, 386,786 tons were produced. Output in all of 1960 totaled 1,000,763 tons vs. 1,126,793 in the preceding year.

Wire . . .

Wire Prices, Pages 179 & 180

The wire mills are booking orders a little more actively, but the improvement is not equal to that being experienced in other major steel products.

Hard hit by foreign competition in recent years, the wiremakers are still fighting for every order they're getting but most say they are making headway. An executive of a Midwest producer thinks his firm will hold its own on merchant products this year and possibly win back some of the business it has lost to foreign mills.

Right now, merchant products are doing better than manufacturers' wire items. The spring upturn in construction, however, didn't develop the order volume that had been expected for April. Most orders call for 15 to 30 days' delivery. That compares with 45 day deliveries a year ago. May and June bookings are reported the heaviest in nearly a year in New England. Demand for manufacturers' wire and spring wire in that area is up nearly 20 per cent from the low point of the recession.

Government services are placing some substantial orders. The U. S. Engineer, Chicago, is taking estimates on 55,000 spools of barbed wire, with an additional 55,000 spools set aside for labor surplus areas. Aviation Supply, Philadelphia, closes May 18 on 181,200 sq ft of wire fabric. The Navy is placing large orders for wire rope. U. S. Steel's Tennessee Coal & Iron Div., Birmingham, has been awarded a $190,375 contract by the Tennessee Valley Authority for steel guy strand to reinforce six, 161 kilovolt transmission lines from the Paradise, Ky., steam plant.

Steel Imports Expected To Hold at 1960 Levels

Steel imports have been rising the last several months. Sales were slow from last October through January, but there has been a fairly steady pickup since; a marked gain started late in March.

One leading importer predicts 1961 imports won't exceed last year's—he expects them to hold at roughly the same level, around 3 million tons. He sees little possibility of imports equaling the peak of 4 million tons reached in 1959, when domestic steel production was disrupted by the strike.

Current improvement reflects a pickup in demand for deformed bars, shapes, and merchant bars. Relatively little plate tonnage is coming in, due to a lag in demand here and also to an import duty handicap.

Wire rod business is slow, with prices spotty. In many cases prices are not published, being negotiated from deal to deal. Trading in hot rolled bands is light but sufficient to sustain the market at recent price levels.

Delivery promises on merchant bars from western Europe average around eight weeks; on deformed bars and shapes, ten weeks; wire rods are usually sold on a quarterly basis, with books opening about six weeks in advance of the quarter.

The home market on the major products in Western Europe remains strong, but wire demand is slow. In Japan, the home market is strong on all products, including wire.

In certain world markets, such as

Africa and South America, demand is a little stronger, particularly for tin plate and stainless sheets. Because they offer better deliveries, European producers, as well as those in the U. S., are sharing in the improvement, despite the lower prices quoted by Japanese interests.

Steel Bars . . .

Bar Prices, Page 177

Slight improvement is noted in demand for hot rolled carbon bars. Consumers are still buying close to their requirements, and the pickup experienced by the mills has not been enough to appreciably affect delivery promises, which still range two to four weeks. Demand is diversified, and the automotive and appliance industries are ordering more freely. Distributors, cold drawers, and fastener manufacturers have not stepped up their buying to any extent.

April bookings were about 8 per cent above March volume, and May sales are expected to top April's by possibly 10 per cent. Some producers think the slight gains in orders are due to the completion of stock reduction programs. Consumers now seem to be buying as much metal as they're using, and their consumption is increasing.

Automakers stepped up their buying after raising their second quarter production schedules, but they didn't increase their purchases as much as did other industries. They're not expected to start buying heavily again until August or September, when they'll start volume production of next year's model cars.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 178 & 179

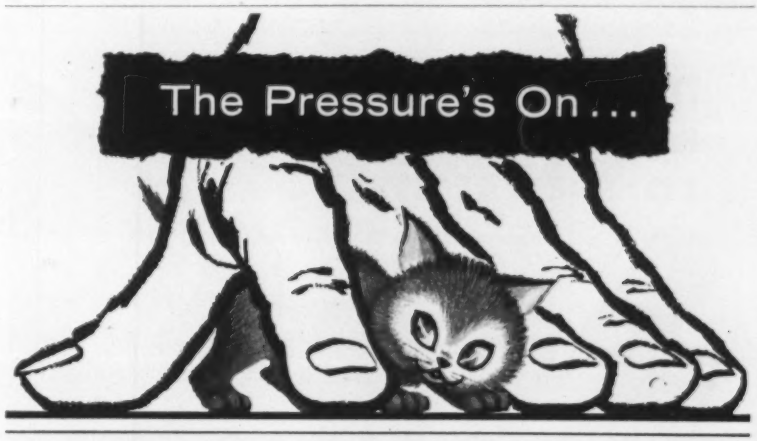
Although sheet steel deliveries show little change from the schedule prevailing in recent weeks—two to three weeks on hot rolled, two to five on cold rolled—buyers are beginning to evince more interest in later deliveries, anticipating a tightening in shipment schedules as mill order books begin to bulge.

Shipments on galvanized sheets are already noticeably extended. Tonnage can still be picked up for delivery before the end of this quarter, but some producers are now sold well into July. Galvanized order books are being loaded with tonnage for government storage bins, air conditioning work, and miscellaneous building needs.

Specialties, such as electrical sheets and enameling stock, are available for shipment within 30 days.

The stronger movement of hot and cold rolled sheets reflects broadening demand from the automotive and appliance industries. Also, more business is being placed by makers of shipping containers, and the upturn in construction is contributing substantial demand. One Southern steel producer reports April was his best month in four years, with the improvement most pronounced in the flat rolled products. Another Southern steelmaker reported the largest bookings last week for any like period in the last 12 months.

Slightly heavier demand for narrow, cold rolled strip (carbon and alloy) is bringing out spotty orders for hot rolled sheets for May and June shipment. Most cold finished strip converters in New England



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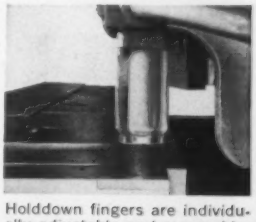

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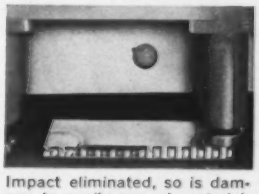

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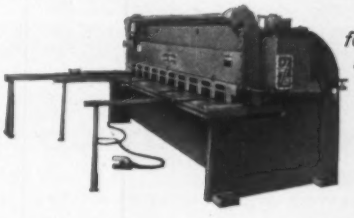

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*PATENTED, TRADEMARK REGISTERED

are not operating better than 50 per cent of capacity. Operating slightly above that average are makers of ultrathin, close tolerance stainless strip.

Plates . . .

Plate Prices, Page 177

Gains are reported in the movement of plates. More tonnage is going into oil storage tanks, fabricated industrial pipe, and structural fabrication. The shipyards are taking heavier tonnage, and some line pipe tonnage is developing. However, platemakers say they still have a long way to go before over-all business can be termed brisk. They can still give relatively prompt shipments.

Naval shipyard buying is more active. Some third quarter volume is out for estimates. Bids close May 22 at Philadelphia on about 3000 tons, mostly hull plates. A plate girder bridge in Vermont will take 2245 tons, but plate bridgework in the East is not heavy. An award of 1400 tons of plate for 7 miles of 28 in. water supply line at Aberdeen, Wash., is pending. A water project for the Vernon District, Portland, Oreg., calling for 1200 tons, is being rebid.

Plate fabricating shops are estimating slightly more industrial tonnage in New England, but they are placing mill orders only against firm commitments.

The gradual pickup in plate demand at Pittsburgh reflects increasing orders from line pipe makers. They're getting more business from gas transmission companies as the Federal Power Commission expedites its clearance of new projects.

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Steel Shipments in March Score 19 Per Cent Pickup

Shipments of steel products direct from the mills during March amounted to 5,046,523 net tons, 796,000 tons (19 per cent) above the February total of 4.2 million, reports the American Iron & Steel Institute. Gains were reported in all product categories, and the month's total was the highest since last August.

During the first quarter, direct mill shipments amounted to 13,918,-681 net tons, down sharply from the 24 million tons reported in the same period a year ago.

All major markets received larger shipments in March than during the preceding month. Those showing a greater than average percentage increase included: Warehouses and distributors, up 33 per cent; contractors' products, up 26 per cent; agriculture, up 23 per cent; and construction (including maintenance), up 23 per cent.

Principal product shipments during March and comparisons with the preceding month follow:

Leading Steel Product Shipments—1961
(Net tons)

	March	February
Cold Rolled Sheets	847,144	743,223
Hot Rolled Sheets	491,327	454,389
Plates	477,994	394,966
HR Bars	471,158	402,475
Electro. Tin Plate	454,768	402,578

The following shows market classifications to which the largest amounts of finished steel products went during March, compared with February:

Leading Market Classifications—1961
(Net tons)

	March	February
Warehouses	997,182	751,196
Automotive	708,167	690,770
Construction	702,269	572,942
Containers	547,395	494,148
Machinery, etc.	309,363	261,775

Tubular Goods . . .

Tubular Goods Prices, Page 181

Oil country goods producers report a mixed market. One large Pittsburgh area maker says his April shipments were the best so far this year—up 10 per cent from March volume. A smaller company, however, reported April shipments were off about 20 per cent, reversing a steady uptrend that started in January.

Both makers expect their May shipments will be larger than April's, but neither can predict how much. Reason: Users are still buying on a quick delivery basis, waiting until late in the month before ordering.

The upturn in demand reflects depletion of inventories held by distributors and major oil companies. Stocks of everything but specialties (heavy walled, high yield strength items) are low. There's no incentive for users to rebuild stocks because the mills can ship most popular sizes of tubing and casing from stock.

The Hughes Tool Co.'s latest survey shows 1746 rotary oil rigs in operation in the U. S., up 55 from the preceding week. Active rigs in Canada totaled 79, a decrease of eight.

Structural Fabricators' Bookings Rise in March

Fabricated structural steel bookings in March increased 15 per cent to 295,739 tons compared with February's total, reports the American Institute of Steel Construction. However, March volume was off 23 per cent from that in the same period of 1960.

Bookings in the first quarter (860,167 tons) were off 10 per cent from volume in the like three months of last year.

The industry shipped 292,361 tons in March, 12 per cent above the 260,158 tons moved in February but down 6 per cent from shipments in March a year ago. The total for the first three months of the year was 814,148 tons vs. 817,605 in the same period of 1960.

Order backlogs held by fabricators as of Mar. 31 were 2,392,099 tons. Of that total, 1,306,726 tons, 55 per cent, were scheduled for fabrication within the four months ending July 31.

Structural Shapes . . .

Structural Shape Prices, Page 177

Demand for structurals not only is increasing, but it's marked by a wider range of projects, including industrial work. Order backlogs of fabricators are rising, but the tonnage is unevenly distributed. That explanation is given for the failure of fabricated material prices to show more strength.

Wide flange sections are moving better than they were a month ago, volume being estimated to be up at least 10 per cent. Standard structurals, however, show little change.

Shipbuilders are among the most active buyers of structural material. Railroad carbuilders are keeping their purchases at a minimum. Machinery builders are buying at a steady but depressed rate.

Kaiser Steel Corp., Oakland, Calif., will fabricate 10,000 tons of structurals for the San Pedro-Terminal Island toll bridge in California, scheduled for completion in 1963. Legislative action has been

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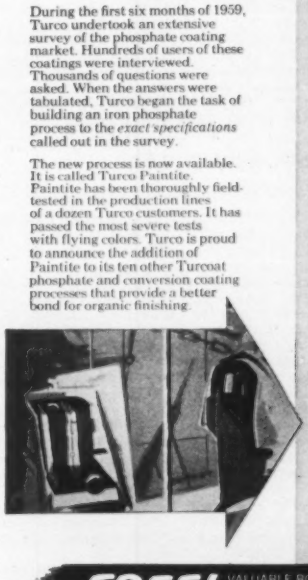

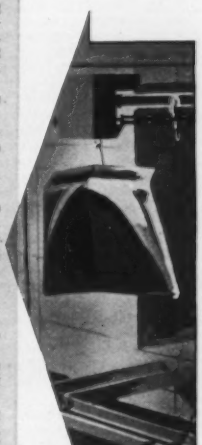

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taken by Washington and Oregon assuring joint construction of a proposed two lane, 4.1 mile bridge across the Columbia River at Astoria, Oreg. Estimated cost: $24 million.

The Prudential Center project in Boston will be scaled down. Six 25 story apartment buildings will be eliminated, reducing the $150 million project by one-third. Foundations for the tower were completed last fall, and 25,000 tons of fabricated structural steel (fabricated by American Bridge Div., U. S. Steel Corp.) are on site.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

5650 tons, Kanawha River bridge, Putnam County, West Virginia, awarded by the State Road Commission.

1752 tons, 11 bridge structures, Southington, Conn., to Standard Structural Steel Co., Hartford, Conn; Angelo Tomasso Inc., New Britain, Conn., general contractor.

1500 tons, Bishop Reilly High School, Queens, New York, through Caristo Construction Co., general contractor, to Lehigh Structural Steel Co., Allentown, Pa.

1450 tons, eight highway structures, Rocky Hill-Wethersfield, Conn., to City Iron Works, Hartford, Conn.; White Oak Excavators Inc., Plainville, Conn., general contractor.

900 tons, 14 story apartment for Tengren Estates, New York, to Lehigh Structural Steel Co., Allentown, Pa.

600 tons, state bridgework, Baltimore, through Harry E. Eastburn, general contractor, to High Welding Co., Lancaster, Pa.

592 tons, two state bridges, Interstate Route 95, Yarmouth, Maine, project 1-94-4 (10) 60, to Bancroft & Martin Rolling Mills Co., South Portland, Maine; Frank Rossi & Sons Inc., Gardiner, Maine, general contractor.

512 tons, Art Institute of Chicago, Chicago; Shaw Metz & Associates, architect, to Vierling Steel Works, Chicago.

500 tons, heating and refrigeration plant, O'Hare International Airport, Chicago, for City of Chicago, to Mississippi Valley Structural Steel Co., Chicago.

450 tons, state bridgework, Wicomico County, Maryland, through Gordon Lynch, general contractor, to Atlas Machine & Iron Works, Arlington, Va.

415 tons, student center, Drexel Institute, Philadelphia, through Joseph R. Farrell Inc., general contractor, to Bethlehem Steel Co., Bethlehem, Pa.

390 tons, senior high school, Paoli, Pa., through Fleming Co., general contractor, to Cantley & Co., Philadelphia; also, 150 tons of joists to Truscon Div., Youngstown, Republic Steel Corp.

330 tons, A. P. Orleans & Co., shopping center, Philadelphia, to Grays Metal Works, Philadelphia.

240 tons, bridge, Route 41, Project F744 (3), State of Indiana, to Vierling Steel Works, Chicago.

206 tons, highway bridge superstructure, Newton, Mass., to Tower Iron Works, Providence, R. I.; B. J. Pentabone Inc., Newton, general contractor; 50 tons of concrete reinforcing bars went to Northern Steel Inc., Boston.

184 tons, Project S1496(7), State of Iowa, Buchanan County, to Vierling Steel Works, Chicago.

STRUCTURAL STEEL PENDING

11,000 tons, transmission towers for Arizona Power Co.; bids in May 2 at Phoenix, Ariz.

2400 tons, Clearview Expressway, Queens County, New York; Grow Construction Corp. and Andrew Catapamo Inc. jointly low on general contract.

2036 tons, seven-span welded composite plate girder bridge, South Burlington-Winooski, Vt., 1-89-3 (10) contract 1; H. W. Hinman Inc., Westbrook, Maine, low on the general contract; also, 688 tons of concrete reinforcing bars and 4810 linear feet of steel piling.

1284 tons, state bridgework, Albany County, New York; D. A. Collins Co., Mechanicsville, N. Y., low on general contract.

1000 tons, state bridgework, Middlesex County, New Jersey; Public Constructors, Camden, N. J., low on general contract.

900 tons, transmission towers; bids to Bonneville Power Administration, Portland, Oreg., May 10.

510 tons, highway structures, Anacostia Freeway, Pennsylvania Avenue, Washington, D. C.; Federal Project U-45 (22); bids May 23, District of Columbia Highway Department.

383 tons, one, four span composite wide flange beam bridge, Interstate Route 89, South Burlington, Vt.; bids May 26, Montpelier, Vt.; also, 155 tons of concrete reinforcing bars and 8540 linear ft of steel piling.

250 tons, U. S. Coast Guard shore station, Brenton Reef, Buzzards Bay, Mass.; Perini Corp., Framingham, Mass., low on the general contract.

220 tons, one, single span and one, two span, composite, wide flange beam bridges, Bridgewater, Vt.; S. V. Rossi Construction Co. Inc., Torrington, Conn., is low on the general contract.

135 tons, North Capital St. overpass, Washington, Pa.; McCloskey & Co., Philadelphia, is low on the general contract.

125 tons, intermediate school, Spokane, Wash.; bids soon.

100 tons, Blaine, Wash., air base radar tower; general contract to Florence Construction Co., Bellingham, Wash., low at $206,810 to U. S. Engineer, Seattle.

100 tons, radar tower, Sparrevohn Air Base, Alaska; bids to U. S. Engineer, Anchorage, Alaska, May 18.

100 tons, radio tower and steel frame building, Naselle Air Base, Washington State; bids to U. S. Engineer, Seattle, about June 8.

100 tons, including 45 tons of reinforcing bars, 45 tons of pipe and miscellaneous; pumping unit, Chief Joseph Dam, East Wenatchee, Wash.; Frank Coluccio Construction Co., Seattle, low at $1,396,235 to the Bureau of Reclamation.

REINFORCING BARS . . .

REINFORCING BARS PLACED

2200 tons, Southwark Public Housing Development, Philadelphia, through McCloskey & Co., Philadelphia, general contractor, to Bethlehem Steel Co., Bethlehem, Pa.

2100 tons, wire mesh, paving of 120 acres at O'Hare International Airport, Chicago, to American Steel & Wire Div., Joliet, Ill., U. S. Steel Corp.; Arcole Midwest Corp., Chicago, is contractor.

1400 tons, approaches to second Lake Washington bridge, Seattle, to Northwest Steel Rolling Mills Inc., Seattle; General Construction Co. and Manson Construction & Engineering Co., Seattle, general contractors.

630 tons, overpass, Washington, D. C., through McCloskey & Co., Philadelphia, general contractor, to Bethlehem Steel Co., Bethlehem, Pa.

530 tons, classroom facilities, University of Scranton, Scranton, Pa., through Sordoni Contracting Co., general contractor, to Bethlehem Steel Co., Bethlehem, Pa.

400 tons, addition to St. Christopher's Hospital, Philadelphia, through Mason & Cullin, Philadelphia, to Bethlehem Steel Co., Bethlehem, Pa.

325 tons, power tunnel, University of Washington, Seattle, to Northwest Steel Rolling Mills Inc., Seattle; James I. Barnes Construction Co., Seattle, general contractor.

250 tons, dormitory, project B1-D-211B, University of Connecticut, Storrs, Conn., to Sherer Steel Co., East Hartford, Conn.; 50 tons of fabricated structural steel to Berlin Construction Co., Berlin, Conn.

240 tons, women's dormitory, University of Washington, Seattle, to James D. English Steel Co., Tacoma, Wash.; Abshor Construction Co., Tacoma, Wash., general contractor.

233 tons, water reservoir, Alderwood Manor, Wash., to Pacific Coast Div., Bethlehem Steel Co., Seattle; Rasmussen-Beck Co., Sunnyside, Wash., general contractor.

165 tons, two state highway bridges, Interstate Route 95, Yarmouth, Maine, to Bancroft & Martin Rolling Mills Co., South Portland, Maine; Frank Rossi & Sons Inc., Gardiner, Maine, general contractor.

150 tons, Washington State box girder bridge, King County, to Northwest Steel Rolling Mills Inc., Seattle; Allen R. Anderson, Seattle, general contractor, at $156,790.

141 tons, military installation, Ft. Yukon, Alaska, to Pacific Coast Div., Bethlehem Steel Co., Seattle; Ghemm Construction Co., Anchorage, Alaska, is general contractor.

REINFORCING BARS PENDING

3420 tons, Yellowtail Dam and powerhouse, Montana; general contract to Morrison-Knudsen Co., Boise, Idaho, at $39,809,359, jointly with Kaiser Co., Oakland, Calif., Perini Corp., Walsh Construction Co., and F. & S. Contracting Co., Butte, Mont., by the Bureau of Reclamation.

250 tons, Burke Memorial Library, University of Washington; general contract to John H. Sellen Construction Co., Seattle, at $801,800.

235 tons, Idaho State, six highway passes, Bonneville County; Rogers Construction Co., Portland, Oreg., is low at $1,556,261.

220 tons, highway span, Lewis County, Washington; general contract to Lee T. Dulin, Kent, Wash., low at $102,420.

175 tons, Washington State interchange, Longview, Wash.; bids to Olympia, Wash., May 23.

165 tons, Seneca Street ramp, Seattle; general contract to Willar Construction Co., Seattle, low at $276,684.

150 tons, box girder bridge, King County, Washington; general contract to Allen R. Anderson, Seattle, low at $155,790.

150 tons, two Oregon coast highway bridges; bids to the Bureau of Public Roads, Portland, Oreg., June 1.

125 tons, paving, Grays Harbor County, Washington; general contract to Erickson Paving Co., Bellevue, Wash., low at $413,178.

100 tons plus, dormitory, state college, Bellingham, Wash.; general contract to Cawdrey & Vemo, Seattle.

100 tons, Washington State highway spans and piling, Spokane and Clark counties; bids to Olympia, May 23.

80 tons, also piling, etc., 425 ft bridge, Canyon County, Idaho; W. R. Cahoon Construction Co., Pocatello, Idaho, low at $116,860.

RAILS, CARS . . .

LOCOMOTIVES PLACED

Colombian National Railways, 15 diesel-electric locomotives, to General Electric Co., Schenectady, N. Y.; eight will be 900 hp, six 1420 hp, and one 700 hp.

RAILROAD CARS PLACED

Maine Central, 200 boxcars to Pullman-Standard Div., Chicago, Pullman Inc., for construction at Pullman's Michigan City, Ind., plant.

Bangor & Aroostook, five boxcars, to Pacific Car & Foundry Co., Renton, Wash.

Canadian Pacific, 1150, fifty-ton boxcars, 700 to the National Steel Car Corp., Hamilton, Ont., and 450 to the Canadian Car & Foundry Co., Montreal.

Union Tank Car Co., 137 tankcars to its own shops, Whiting, Ind.

PLATES . . .

PLATES PLACED

477 tons, hull (two contracts), Military Industrial Supply Agency, Navy, Philadelphia, to Caine Steel Co., Philadelphia; also, 69 tons to U. S. Steel Corp., Pittsburgh.

261 tons, hull plates, Military Industrial Supply Agency, Navy, Philadelphia, to Pines Steel Co., New York; also, 134 tons of stainless sheets, to Crucible Steel Co. of America, Pittsburgh (two contracts).

228 tons, high tensile, including 90 tons, grade Hy-80, Navy Purchasing Office, Washington, to Lukens Steel Co., Coatesville, Pa. (two contracts).

170 tons, hull, Military Industrial Supply Agency, Navy, Philadelphia, to Carroll Steel

Co., Woodbury, N. J.

105 tons, high tensile, Military Industrial Supply Agency, Navy, Philadelphia, to Lukens Steel Co., Coatesville, Pa.

100 tons, Annapolis, Wash., Water District water tank, to Chicago Bridge & Iron Co., Seattle.

PLATES PENDING

2040 tons, carbon hull plates (three contracts), Military Industrial Supply Agency, Navy, Philadelphia, bids May 22; also, 75 tons of sheets, and 22 tons of stainless floor plate.

1400 tons, 7 miles 28 in. water supply pipe, Aberdeen, Wash.; Taylor Construction Co., Seattle, low at $530,611 for welded steel, $547,579 for concrete cylinder.

1200 tons, 5.7 million gallon elevated water tank; rebids to Vernon District, Portland, Oreg., May 18.

585 tons, hull plates, Military Industrial Supply Agency, Navy, Philadelphia; bids May 16; also, 93 tons of steel bars, 302 grade M.

150 tons, elevated water tank; Chicago Bridge & Iron Co., Seattle, low at $47,143 to Annapolis, Wash.

125 tons, 200,000 gallon steel water storage reservoir, McChord Air Force Base, Washington; bids June 6 to the U. S. Engineer, Seattle.

100 tons or more, 15,000 gallon capacity underground fuel tanks at 12 missile launching sites; bids about May 24 to the U. S. Engineer, Tulsa, Okla.

Steel Output Hits 2 Million Ton Mark

STEEL INGOT production reached the 2 million ton mark during the week ended May 13 for the first time since the week ended May 21, 1960. The record for the first 19 weeks of the year shows that production declined only three times and held steady once. The trend is expected to continue for several weeks.

Developments confirm the forecasts of most steelmaking executives of a steady month-by-month improvement in orders and shipments. Now that the automotive industry has come back into the buying picture, a pickup can be seen across the board. Steelmakers do not yet see the start of an inventory buildup, but with increased buying, more consumers are beginning to take a close look at their stocks and possible delivery schedules.

• **Youngstown**—Youngstown Sheet & Tube Co. relighted two more open hearth furnaces at its Campbell (Ohio) Works while Republic Steel Corp. relighted one, raising the district rate to above 49 per cent of 1960 capacity for the week ended May 13.

• **Pittsburgh** — Steelmaking operations rose fractionally higher in the week ended May 13. Among producers increasing production schedules was Crucible Steel Co. of America, adding one open hearth and one electric furnace at its Midland (Pa.) Works.

• **Buffalo**—Steel production made another sharp advance with the lighting of additional open hearth furnaces, lifting the district rate to about 71 per cent of 1960 capacity for the week ended May 13. Bethlehem Steel Co. is operating 24 of 35 open hearths; Republic Steel, four of nine; and Wickwire Spencer Div., Colorado Fuel & Iron Corp., one of three, one having been closed down for repairs. The sharpest increase was registered at the Bethlehem mill where the No. 1 open hearth shop was reactivated and five furnaces relighted in that unit.

• **Chicago**—Steelmakers here are receiving larger orders and boosted ingot operations during the week ended May 13 about 2 points to an estimated 73 per cent of 1960 capacity.

• **Detroit** — Two mills stepped up activity during the week ended May 13 by adding another turn on their furnaces. Outlook is for continued high production.

• **Cleveland** — Continued improvement in steel orders has resulted in the relighting by Republic Steel of the fifth of six, 400 ton capacity open hearth furnaces here, says R. P. Carpenter, district manager. Since Mar. 4, Republic's plant has resumed production in seven open hearth furnaces and is currently operating ten. Jones & Laughlin Steel Corp. is operating two electric and six open hearth furnaces out of 13.

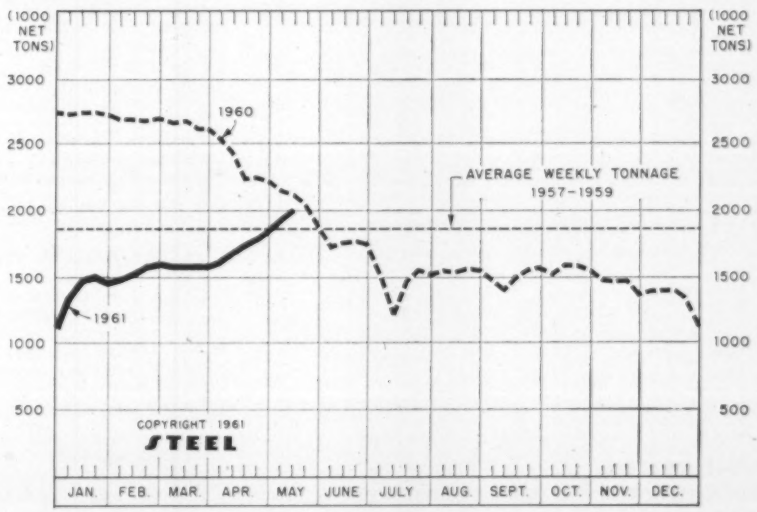
• **Cincinnati**—Two area steel producers added open hearths to their production lines during the week ended May 13. STEEL estimates production at 85,890 tons, or at the equivalent rate of 75 per cent of 1960 capacity. The rate is the best in a year.

STEEL INGOT PRODUCTION

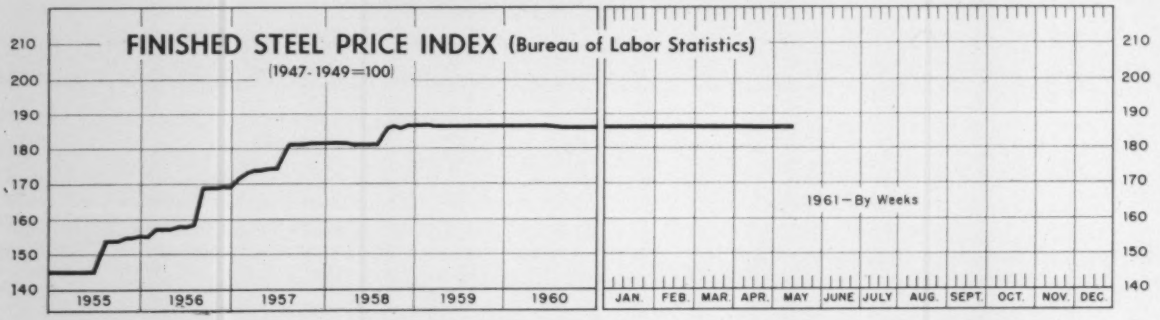
Weeks Ended	Net Tons	Change
May 13	2,000,000*	+ 2.9%
May 6	1,943,000	+ 4.6%
Apr. 29	1,858,000	+ 4.1%
Totals to May 6		
1961	28,987,000	−36.8%
1960	45,877,000	

DISTRICTS	Week Ended May 6 Tons‡	Index†	Week Ended Apr. 29 Index†
Northeastern	285,900	107	103
Buffalo	109,038	112	100
Pittsburgh	371,265	92	90
Youngstown	151,283	89	84
Cleveland	107,410	116	105
Detroit	122,753	117	113
Chicago	396,521	106	102
Cincinnati	85,208	113	103
St. Louis	58,331	111	113
Southern	109,480	101	94
Western	144,972	124	121
Industry	1,943,000	104.3	99.7

*Estimated by STEEL.
†1957-59 (1,862,933 tons)=100.
‡District tonnages are approximate and will not necessarily add to the national total.



Price Indexes and Composites



May 9, 1961	Week Ago	Month Ago	Apr. Index	Year Ago
186.1	186.1	186.1	186.1	186.8

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended May 9

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard No. 1	$5.825	Bars, H.R., Carbon	6.675
Rails, Light, 40 lb	7.292	Bars, Reinforcing	6.335
Tie Plates	6.875	Bars, C.F., Carbon	10.710
Axles, Railway	10.175	Bars, C.F., Alloy	14.125
Wheels, Freight Car, 33 in. (per wheel)	62.000	Bars, C.F., Stainless, 302 (lb)	0.570
Plates, Carbon	6.350	Sheets, H.R., Carbon	6.350
Structural Shapes	6.167	Sheets, C.R., Carbon	7.300
Bars, Tool Steel, Carbon (lb)	0.560	Sheets, Galvanized	8.775
Bars, Tool Steel, Alloy, Oil Hardening Die (lb)	0.680	Sheets, C.R., Stainless, 302 (lb)	0.658
Bars, Tool Steel, H.R. Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.060 (lb)	1.400	Sheets, Electrical	12.625
Bars, Tool Steel, H.R. Alloys, High Speed, W18 Cr 4, V 1 (lb)	1.895	Strip, C.R., Carbon	9.225
Bars, H.R., Alloy	10.775	Strip, C.R., Stainless, 430 (lb)	0.480
Bars, H.R., Stainless, 303 (lb)	0.543	Strip, H.R., Carbon	6.250
		Pipe, Black, Buttweld (100 ft)	19.495
		Pipe, Galv., Buttweld (100 ft)	23.098
		Pipe Line (100 ft)	195.430
		Casing, Oil Well, Carbon (100 ft)	201.080
		Casing, Oil Well, Alloy (100 ft)	315.213
		Tubes, Boiler (100 ft)	51.200
		Tubing, Mechanical, Carbon (100 ft)	27.005
		Tubing, Mechanical, Stainless, 304 (100 ft)	194.268
		Tin plate, Hot-dipped, 1.25 lb (95 lb base box)	10.100
		Tin Plate, Electrolytic, 0.25 lb (95 lb base box)	8.800
		Black Plate, Canmaking Quality (95 lb base box)	7.900
		Wire, Drawn, Carbon	10.575
		Wire, Drawn, Stainless, 430 (lb)	0.665
		Bale Ties (Bundles)	7.647
		Nails, Wire, 8d Common	9.433
		Wire, Barbed (80-rod spool)	8.372
		Woven Wire Fence (20-rod roll)	20.910

STEEL's FINISHED STEEL PRICE INDEX

	May 10 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Index (1935-39 avg=100)	247.82	247.82	247.82	247.82	210.45
Index in cents per lb	6.713	6.713	6.713	6.713	5.701

STEEL's ARITHMETICAL PRICE COMPOSITES

Finished Steel, NT	$149.96	$149.96	$149.96	$149.96	$128.98
No. 2 Fdry, Pig Iron, GT	66.49	66.49	66.49	66.49	60.27
Basic Pig Iron, GT	65.99	65.99	65.99	65.99	59.80
Malleable Pig Iron, GT	67.27	67.27	67.27	67.27	61.27
Steelmaking Scrap, GT	36.33	37.00	39.50	33.33	53.00

Comparison of Prices

Comparative prices by districts in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	May 10 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bars, H.R., Pittsburgh	5.675	5.675	5.675	5.675	4.65
Bars, H.R., Chicago	5.675	5.675	5.675	5.675	4.65
Bars, H.R., deld., Philadelphia	5.98	5.98	5.98	5.975	4.93
Bars, C.R., Pittsburgh	7.65	7.65	7.65	7.65	6.25
Shapes, Std., Pittsburgh	5.50	5.50	5.50	5.50	4.60
Shapes, Std., Chicago	5.50	5.50	5.50	5.50	4.60
Shapes, deld., Philadelphia	5.745	5.745	5.745	5.77	5.09
Plates, Pittsburgh	5.30	5.30	5.30	5.30	4.50
Plates, Chicago	5.30	5.30	5.30	5.30	4.50
Plates, Coatesville, Pa.	5.30	5.30	5.30	5.30	4.80
Plates, Sparrows Point, Md.	5.30	5.30	5.30	5.30	4.50
Plates, Claymont, Del.	5.30	5.30	5.30	5.30	5.35
Sheets, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.325
Sheets, H.R., Chicago	5.10	5.10	5.10	5.10	4.325
Sheets, C.R., Pittsburgh	6.275	6.275	6.275	6.275	5.325
Sheets, C.R., Chicago	6.275	6.275	6.275	6.275	5.325
Sheets, C.R., Detroit	6.275	6.275	6.275	6.275	5.325-5.425
Sheets, Galv., Pittsburgh	6.875	6.875	6.875	6.875	5.85
Strip, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.325
Strip, H.R., Chicago	5.10	5.10	5.10	5.10	4.325
Strip, C.R., Pittsburgh	7.425	7.425	7.425	7.425	6.25
Strip, C.R., Chicago	7.425	7.425	7.425	7.425	6.25-6.35
Strip, C.R., Detroit	7.425	7.425	7.425	7.425	6.35
Wire, Basic, Pittsburgh	8.00	8.00	8.00	8.00	6.60
Nails, Wire, nonstock, Pitts.	8.95	8.95	8.95	8.95	7.60
Tin Plate (1.50 lb) box, Pitts.	$10.65	$10.65	$10.65	$10.65	$9.85
SEMIFINISHED STEEL					
Billets, forging, Pitts. (NT)	$99.50	$99.50	$99.50	$99.50	$84.50
Wire rods, ½-⅝" Pitts.	6.40	6.40	6.40	6.40	5.375

PIG IRON, Gross Ton	May 10 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bessemer, Pittsburgh	$67.00	$67.00	$67.00	$67.00	$61.00
Basic, Valley	66.00	66.00	66.00	66.00	60.00
Basic, deld., Philadelphia	70.18	70.18	70.18	70.41	63.76
No. 2 Fdry, NevilleIsland, Pa.	66.50	66.50	66.50	66.50	60.50
No. 2 Fdry, Chicago	66.50	66.50	66.50	66.50	60.50
No. 2 Fdry, deld., Phila.	70.68	70.68	70.68	70.91	64.26
No. 2 Fdry, Birmingham	62.50	62.50	62.50	62.50	55.00
No. 2 Fdry (Birm.), deld., Cin.	70.20	70.20	70.20	70.20	62.70
Malleable, Valley	66.50	66.50	66.50	66.50	60.50
Malleable, Chicago	66.50	66.50	66.50	66.50	60.50
Ferromanganese, net tons†	245.00	245.00	245.00	245.00	215.00

†74-76% Mn, Duquesne, Pa.

SCRAP, Gross Ton (Including broker's commission)					
No. 1 Heavy Melt, Pittsburgh	$34.50	$34.50	$36.50	$33.50	$51.50
No. 1 Heavy Melt, E. Pa.	39.00	40.00	43.00	35.00	56.00
No. 1 Heavy Melt, Chicago	35.50	36.50	39.00	31.50	51.50
No. 1 Heavy Melt, Valley	36.50	36.50	38.50	35.50	57.50
No. 1 Heavy Melt, Cleve.	33.50	33.50	35.50	32.50	54.50
No. 1 Heavy Melt, Buffalo	31.50	31.50	31.50	30.50	53.50
Rails, Rerolling, Chicago	57.50	57.50	59.50	52.50	72.50
No. 1 Cast, Chicago	41.50	42.50	43.50	42.50	52.50
COKE, Net Ton					
Beehive, Furn., Connisvl.	$15.00	$15.00	$15.00	$15.00	$14.125
Beehive, Fdry., Connisvl.	18.25	18.25	18.25	18.25	16.50
Oven, Fdry., Milwaukee	32.00	32.00	32.00	32.00	27.50

Steel Prices

Mill prices as reported to STEEL, May 10, cents per pound except as otherwise noted. *Changes shown in italics.* Code number following mill point indicates producing company. Key to producers, page 178; footnotes, page 180.

SEMIFINISHED

INGOTS, Carbon Forging (NT)

Munhall,Pa. U5 .....$76.00

INGOT, Alloy (NT)

Detroit S41 .....$82.00
Economy,Pa. B14 .....82.00
Farrell,Pa. S3 .....82.00
Lowellville,O. S3 .....82.00
Midland,Pa. C18 .....82.00
Munhall,Pa. U5 .....82.00
Sharon,Pa. S3 .....82.00

BILLETS, BLOOMS & SLABS
Carbon Rerolling (NT)

Bartonville,Ill. K4 ....$82.00
Bessemer,Pa. U5 .....80.00
Buffalo R2 .....80.00
Clairton,Pa. U5 .....80.00
Ensley,Ala. T2 .....80.00
Fairfield,Ala. T2 .....80.00
Fontana,Calif. K1 ....90.50
Gary,Ind. U5 .....80.00
Johnstown,Pa. B2 ....80.00
Lackawanna,N.Y. B2 ..80.00
Munhall,Pa. U5 .....80.00
Owensboro,Ky. G8 ....80.00
S.Chicago,Ill. R2, U5 ..80.00
S.Duquesne,Pa. U5 ....80.00
Sterling,Ill. N15 .....80.00
Youngstown R2 .....80.00

Carbon, Forging (NT)

Bessemer,Pa. U5 ....$99.50
Buffalo R2 .....99.50
Canton,O. R2 .....102.00
Clairton,Pa. U5 .....99.50
Conshohocken,Pa. A3 .99.50
Ensley,Ala. T2 .....99.50
Fairfield,Ala. T2 .....99.50
Farrell,Pa. S3 .....99.50
Fontana,Calif. K1 ....109.00
Gary,Ind. U5 .....99.50
Geneva,Utah C11 .....99.50
Houston S5 .....104.50
Johnstown,Pa. B2 ....99.50
Lackawanna,N.Y. B2 ..99.50
LosAngeles B3 .....109.00
Midland,Pa. C18 .....99.50
Munhall,Pa. U5 .....99.50
Owensboro,Ky. C8 ....99.50
Seattle B3 .....109.00
Sharon,Pa. S3 .....99.50
S.Chicago R2, U5, W14..99.50
S.Duquesne,Pa. U5 ....99.50
S.SanFrancisco B3 ....109.00
Warren,O. C17 .....99.50

Alloy, Forging (NT)

Bethlehem,Pa. B2 ...$119.00
Bridgeport,Conn. C32..119.00
Buffalo R2 .....119.00
Canton,O. R2, T7 ....119.00
Conshohocken,Pa. A3 .121.00
Detroit S41 .....119.00
Economy,Pa. B14 ....119.00
Farrell,Pa. S3 .....119.00
Fontana,Calif. K1 ....140.00
Gary,Ind. U5 .....119.00
Houston S5 .....124.00
Ind.Harbor,Ind. Y1 ..119.00
Johnstown,Pa. B2 ....119.00
Lackawanna,N.Y. B2..119.00
LosAngeles B3 .....139.00
Lowellville,O. S3 ....119.00
Massillon,O. R2 .....119.00
Midland,Pa. C18 .....119.00
Munhall,Pa. U5 .....119.00
Owensboro,Ky. G8 ....119.00
Seattle(6) B3 .....140.00
Sharon,Pa. S3 .....119.00
S.Chicago R2,U5,W14..119.00
S.Duquesne,Pa. U5 ..119.00
Struthers,O. Y1 .....119.00
Warren,O. C17 .....119.00

ROUNDS, SEAMLESS TUBE (NT)

Buffalo R2 .....$122.50
Canton,O. R2 .....125.00
Cleveland R2 .....122.50
Gary,Ind. U5 .....122.50
S.Chicago,Ill. R2,W14..122.50
S.Duquesne,Pa. U5 ...122.50
Warren,O. C17 .....122.50

SKELP

Aliquippa,Pa. J5 .....5.05
Benwood,W.Va. W10 ...5.05
Ind.Harbor,Ind. Y1 ....5.05
Munhall,Pa. U5 .....5.05
Pittsburgh J5 .....5.05
Warren,O. R2 .....5.05
Youngstown R2, U5 ....5.05

WIRE RODS

AlabamaCity,Ala. R2 ...6.40
Aliquippa,Pa. J5 .....6.40
Alton,Ill. L1 .....6.60
Bartonville,Ill. K4 .....6.50
Buffalo W12 .....6.40
Cleveland A7 .....6.40
Donora,Pa. A7 .....6.40
Fairfield,Ala. T2 .....6.40
Houston S5 .....6.65
IndianaHarbor,Ind. Y1 .6.40
Johnstown,Pa. B2 .....6.40
Joliet,Ill. A7 .....6.40
KansasCity,Mo. S5 ....6.65
Kokomo,Ind. C16 .....6.50
LosAngeles B3 .....7.20
Minnequa,Colo. C10 ....6.65
Monessen,Pa. P7 .....6.40
Pittsburg,Calif. C11 ....7.20
Portsmouth,O. P12 ....6.40
Roebling,N.J. R5 .....6.50
S.Chicago,Ill. R2, W14..6.40
SparrowsPoint,Md. B2 ..6.50
Sterling,Ill.(1) N15 ....6.40
Sterling,Ill. N15 .....6.50
Struthers,O. Y1 .....6.40
Worcester,Mass. A7 ....6.70

STRUCTURALS

Carbon Steel Std. Shapes

AlabamaCity,Ala. R2 ...5.50
Aliquippa,Pa. J5 .....5.50
Atlanta A11 .....5.70
Bessemer,Ala. T2 .....5.50
Bethlehem,Pa. B2 .....5.55
Birmingham C15 .....5.50
Clairton,Pa. U5 .....5.50
Fairfield,Ala. T2 .....5.50
Fontana,Calif. K1 ....6.30
Gary,Ind. U5 .....5.50
Geneva,Utah C11 .....5.50
Houston S5 .....5.60
Ind.Harbor,Ind. I-2, Y1..5.50
Johnstown,Pa. B2 .....5.55
Joliet,Ill. P22 .....5.50
KansasCity,Mo. S5 ....5.60
Lackawanna,N.Y. B2 ...5.55
LosAngeles B3 .....6.20
Minnequa,Colo. C10 ....5.80
Munhall,Pa. U5 .....5.50
Niles,Calif. P1 .....6.25
Phoenixville,Pa. P4 ....5.55
Portland,Oreg. O4 .....6.25
Seattle B3 .....6.25
S.Chicago,Ill. U5, W14 .5.50
S.SanFrancisco B3 .....6.15
Sterling,Ill. N15 .....5.50
Struthers,O. Y1 .....5.50
Torrance,Calif. C11 ....6.20
Weirton,W.Va. W6 ....5.50

Wide Flange

Bethlehem,Pa. B2 .....5.55
Clairton,Pa. U5 .....5.50
Fontana,Calif. K1 .....6.45
IndianaHarbor,Ind. I-2 ..5.50
Lackawanna,N.Y. B2 ...5.55
Munhall,Pa. U5 .....5.50
Phoenixville,Pa. P4 ....5.55
S.Chicago,Ill. U5 .....5.50
Sterling,Ill. N15 .....5.50
Weirton,W.Va. W6 .....5.50

Alloy Std. Shapes

Aliquippa,Pa. J5 .....6.80
Clairton,Pa. U5 .....6.80
Gary,Ind. U5 .....6.80
Houston S5 .....6.90
Munhall,Pa. U5 .....6.80
S.Chicago,Ill. U5, W14 ..6.80

H.S., L.A., Std. Shapes

Aliquippa,Pa. J5 .....8.05
Bessemer,Ala. T2 .....8.05
Bethlehem,Pa. B2 .....8.10
Clairton,Pa. U5 .....8.05
Fairfield,Ala. T2 .....8.05
Fontana,Calif. K1 .....8.85
Gary,Ind. U5 .....8.05
Geneva,Utah C11 .....8.05
Houston S5 .....8.15
Ind.Harbor,Ind. I-2, Y1..8.05
Johnstown,Pa. B2 .....8.10
KansasCity,Mo. S5 ....8.15
Lackawanna,N.Y. B2 ...8.10
LosAngeles B3 .....8.75
Munhall,Pa. U5 .....8.05
Phoenixville,Pa. P4 ....8.10
Seattle B3 .....8.80
S.Chicago,Ill. U5, W14 ..8.05
S.SanFrancisco B3 ....8.70
Sterling,Ill. N15 .....7.75
Struthers,O. Y1 .....8.05

H.S., L.A., Wide Flange

Bethlehem,Pa. B2 .....8.10
Ind.Harbor,Ind. I-2 .....8.05
Lackawanna,N.Y. B2 ...8.10
Munhall,Pa. U5 .....8.05
S.Chicago,Ill. U5 .....8.05
Sterling,Ill. N15 .....7.75

PILING

BEARING PILES

Bethlehem,Pa. B2 .....5.55
Ind.Harbor,Ind. I-2 ....5.50
Lackawanna,N.Y. B2 ...5.55
Munhall,Pa. U5 .....5.50
S.Chicago,Ill. I-2, U5 ..5.50

STEEL SHEET PILING

Ind.Harbor,Ind. I-2 ....6.50
Lackawanna,N.Y. B2 ...6.50
Munhall,Pa. U5 .....6.50
S.Chicago,Ill. I-2, U5 ...6.50
Weirton,W.Va. W6 .....6.50

PLATES

PLATES, Carbon Steel

AlabamaCity,Ala. R2 ...5.30
Aliquippa,Pa. J5 .....5.30
Ashland,Ky.(15) A10 ...5.30
Atlanta A11 .....5.50
Bessemer,Ala. T2 .....5.30
Clairton,Pa. U5 .....5.30
Claymont,Del. P4 .....5.30
Cleveland J5, R2 .....5.30
Coatesville,Pa. L7 .....5.30
Conshohocken,Pa. A3 ...5.30
Ecorse,Mich. G5 .....5.30
Fairfield,Ala. T2 .....5.30
Farrell,Pa. S3 .....5.30
Fontana,Calif.(30) K1 ...6.10
Gary,Ind. U5 .....5.30
Geneva,Utah C11 .....5.30
GraniteCity,Ill. G4 ....5.40
Houston S5 .....5.40
Ind.Harbor,Ind. I-2, Y1..5.30
Johnstown,Pa. B2 .....5.30
Lackawanna,N.Y. B2 ...5.30
Mansfield,O. E6 .....5.30
Minnequa,Colo. C10 ....6.15
Munhall,Pa. U5 .....5.30
Newport,Ky. A2 .....5.30
Pittsburgh J5 .....5.30
Riverdale,Ill. A1 .....5.30
Seattle B3 .....6.20
Sharon,Pa. S3 .....5.30
S.Chicago,Ill. U5, W14..5.30
SparrowsPoint,Md. B2 ..5.30
Sterling,Ill. N15 .....5.30
Steubenville,O. W10 ....5.30
Warren,O. R2 .....5.30
Youngstown U5, Y1 ....5.30
Youngstown(27) R2 ....5.30

PLATES, Carbon Abras. Resist.

Claymont,Del. P4 .....7.05
Fontana,Calif. K1 .....7.85
Geneva,Utah C11 .....7.05
Houston S5 .....7.15
Johnstown,Pa. B2 .....7.05
SparrowsPoint,Md. B2 ..7.05

PLATES, Wrought Iron

Economy,Pa. B14 .....14.10

PLATES, H.S., L.A.

Aliquippa,Pa. J5 .....7.95
Ashland,Ky. A10 .....7.95
Bessemer,Ala. T2 .....7.95
Clairton,Pa. U5 .....7.95
Claymont,Del. P4 .....7.95
Cleveland J5, R2 .....7.95
Coatesville,Pa. L7 .....7.95
Conshohocken,Pa. A3 ...7.95
Economy,Pa. B14 .....7.95
Ecorse,Mich. G5 .....7.95
Fairfield,Ala. T2 .....7.95
Farrell,Pa. S3 .....7.95
Fontana,Calif.(30) K1 ..8.75
Gary,Ind. U5 .....7.95
Geneva,Utah C11 .....7.95
Houston S5 .....8.05
Ind.Harbor,Ind. I-2, Y1..7.95
Johnstown,Pa. B2 .....7.95
Munhall,Pa. U5 .....7.95
Pittsburgh J5 .....7.95
Seattle B3 .....8.85
Sharon,Pa. S3 .....7.95
S.Chicago,Ill. U5, W14..7.95
SparrowsPoint,Md. B2 ..7.95
Sterling,Ill. N15 .....7.625
Warren,O. R2 .....7.95
Youngstown U5, Y1 ....7.95

PLATES, Alloy

Aliquippa,Pa. J5 .....7.50
Claymont,Del. P4 .....7.50
Coatesville,Pa. L7 .....7.50
Economy,Pa. B14 .....7.50
Farrell,Pa. S3 .....7.50
Fontana,Calif. K1 .....8.30
Gary,Ind. U5 .....7.50
Houston S5 .....7.60
Ind.Harbor,Ind. Y1 ....7.50
Johnstown,Pa. B2 .....7.50
Lowellville,O. S3 .....7.50
Munhall,Pa. U5 .....7.50
Newport,Ky. A2 .....7.50
Pittsburgh J5 .....7.50
Seattle B3 .....8.40
Sharon,Pa. S3 .....7.50
S.Chicago,Ill. U5, W14..7.50
SparrowsPoint,Md. B2 ..7.50
Youngstown Y1 .....7.50

FLOOR PLATES

Cleveland J5 .....6.375
Claymont,Del. P4 .....6.375
Conshohocken,Pa. A3 ...6.375
Ind.Harbor,Ind. I-2 ....6.375
Munhall,Pa. U5 .....6.375
Pittsburgh J5 .....6.375
S.Chicago,Ill. U5 .....6.375

PLATES, Ingot Iron

Ashland c.l.(15) A10 ...5.55
Ashland l.c.l.(15) A10 ..6.05
Cleveland c.l. R2 .....6.05
Warren,O. R2 .....6.05

BARS

BARS, Hot-Rolled Carbon
(Merchant Quality)

Ala.City,Ala.(9) R2 ...5.675
Aliquippa,Pa.(9) J5 ....5.675
Alton,Ill. L1 .....5.875
Atlanta(9) A11 .....5.875
Bessemer,Ala.(9) T2 ....5.675
Birmingham(9) C15 ....5.675
Buffalo(9) R2 .....5.675
Canton,O. (23) R2 .....6.15
Clairton,Pa.(9) U5 .....5.675
Cleveland(9) R2 .....5.675
Ecorse,Mich.(9) G5 ....5.675
Emeryville,Calif. J7 ....6.425
Fairfield,Ala.(9) T2 ....5.675
Fairless,Pa.(9) U5 ....5.825
Fontana,Calif.(9) K1 ...6.375
Gary,Ind.(9) U5 .....5.675
Houston(9) S5 .....5.925
Ind.Harbor(9) I-2, Y1..5.675
Johnstown,Pa.(9) B2 ...5.675
Joliet,Ill. P2 .....5.675
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 .....5.675
LosAngeles(9) B3 .....6.375
Massillon,O.(23) R2 .....6.15
Midland,Pa.(23) C18 ...6.025
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ....6.125
Niles,Calif. P1 .....6.375
Owensboro,Ky.(9) G8 ...6.025
Pittsburg,Calif.(9) C11..6.375
Pittsburgh(9) J5 .....5.675
Portland,Oreg. O4 .....6.425
Riverdale,Ill.(9) A1 ....5.675
Seattle(9) A24,B3,N15 ..6.425
S.Ch'e'go(9)R2,U5,W14 5.675
S.Duquesne,Pa.(9) U5..5.675
S.SanFran.,Calif.(9)B3 6.425
Sterling,Ill.(1)(9) N15..5.675
Sterling,Ill.(9) N15 ....5.775
Struthers,O.(9) Y1 .....5.675
Tonawanda,N.Y. B12 ...5.675
Torrance,Calif.(9) C11 .6.375
Warren,O. C17 .....6.025
Youngstown(9) R2,U5..5.675

BARS, Hot-Rolled Alloy

Aliquippa,Pa. J5 .....6.725
Bethlehem,Pa. B2 .....6.725
Bridgeport,Conn.C32 ....6.80
Buffalo R2 .....6.725
Canton,O. R2, T7 .....6.725
Clairton,Pa. U5 .....6.725
Detroit S41 .....6.725
Economy,Pa. B14 .....6.725
Ecorse,Mich. G5 .....6.725
Farrell,Pa. S3 .....6.725
Fontana,Calif. K1 .....7.775
Gary,Ind. U5 .....6.725
Houston S5 .....6.975
Ind.Harbor,Ind. I-2, Y1..6.725
Johnstown,Pa. B2 .....6.725
KansasCity,Mo. S5 ....6.975
Lackawanna,N.Y. B2 ...6.725
LosAngeles B3 .....7.775
Lowellville,O. S3 .....6.725
Massillon,O. R2 .....6.725
Midland,Pa. C18 .....6.725
Owensboro,Ky. G8 .....6.725
Pittsburgh J5 .....6.725
Seattle(6) B3 .....7.825
Sharon,Pa. S3 .....6.725
S.Chicago R2, U5, W14..6.725
S.Duquesne,Pa. U5 ....6.725
Struthers,O. Y1 .....6.725
Warren,O. C17 .....6.725
Youngstown U5 .....6.725

BARS & SMALL SHAPES, H.R.
High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....8.30
Bessemer,Ala. T2 .....8.30
Bethlehem,Pa. B2 .....8.30
Clairton,Pa. U5 .....8.30
Cleveland R2 .....8.30
Ecorse,Mich. G5 .....8.30
Fairfield,Ala. T2 .....8.30
Fontana,Calif. K1 .....9.00
Gary,Ind. U5 .....8.30
Houston S5 .....8.55
Ind.Harbor,Ind. Y1 ....8.30
Johnstown,Pa. B2 .....8.30
KansasCity,Mo. S5 ....8.55
Lackawanna,N.Y. B2 ...8.30
LosAngeles B3 .....9.00
Pittsburgh J5 .....8.30
Seattle B3 .....9.05
S.Chicago,Ill. R2, W14..8.30
S.Duquesne,Pa. U5 ....8.30
S.SanFrancisco B3 ....9.05
Sterling,Ill. N15 .....7.925
Struthers,O. Y1 .....8.30
Youngstown U5 .....8.30

BAR SIZE ANGLES; H.R. Carbon

Bethlehem,Pa.(9) B2 ..5.825
Houston(9) S5 .....5.925
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 .....5.675
Sterling,Ill. N15 .....5.775
Sterling,Ill.(1) N15 ....5.675
Tonawanda,N.Y. B12 ...5.675

BAR SIZE ANGLES; S. SHAPES

Aliquippa,Pa. J5 .....5.675
Atlanta A11 .....5.875
Joliet,Ill. P22 .....5.675
Minnequa,Colo. C10 ....6.125
Niles,Calif. P1 .....6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 .....6.425
SanFrancisco S7 .....6.52
Seattle B3 .....6.425

BAR SIZE ANGLES; S. SHAPES
Wrought Iron

Economy,Pa. B14 .....16.45

BAR SHAPES, Hot-Rolled Alloy

Aliquippa,Pa. J5 .....6.80
Clairton,Pa. U5 .....6.80
Gary,Ind. U5 .....6.80
Houston S5 .....7.05
KansasCity,Mo. S5 ....7.05
Pittsburgh J5 .....6.80
Youngstown U5 .....6.80

BARS, C.F. Loaded
(Including loaded extra)
Carbon

LosAngeles P2, S30 ...11.75*

Alloy

Ambridge,Pa. W18 ...10.175
BeaverFalls,Pa. M12 ...10.175
Camden,N.J. P13 ....10.35
Chicago W18 .....10.175
Elyria,O. W8 .....10.175
Monaca,Pa. S17 .....10.175
Newark,N.J. W18 ....10.35
SpringCity,Pa. K3 ....10.35

*Grade A; add 0.5c for Grade B.

BARS, Cold-Finished Carbon

Ambridge,Pa. W18 ....7.65
BeaverFalls,Pa. M12,R2..7.65
Birmingham C15 .....8.25
Buffalo B5 .....7.70
Camden,N.J. P13 .....8.10
Carnegie,Pa. C12 .....7.65
Chicago W18 .....7.65
Cleveland A7, C20 ....7.65
Detroit B5, H5, P17 ....7.85
Detroit S41 .....7.65
Donora,Pa. A7 .....7.65
Elyria,O. W8 .....7.65
FranklinPark,Ill. N5 ...7.65
Gary,Ind. R2 .....7.65
GreenBay,Wis. F7 .....7.65
Hammond,Ind. J5, L2 ...7.65
Hartford,Conn. R2 ....8.15
Harvey,Ill. B5 .....7.65
LosAngeles(49) S30 ....9.10
LosAngeles(49) P2, R2..9.10
Mansfield,Mass. B5 ....8.20
Massillon,O. R2, R8 ....7.65
Midland,Pa. C18 .....7.65
Monaca,Pa. S17 .....7.65
Newark,N.J. W18 .....8.10
NewCastle,Pa.(17) B4 ..7.65
Pittsburgh J5 .....7.65
Plymouth,Mich. P5 ....7.90
Putnam,Conn. W18 ....8.20
Readville,Mass. C14 ....8.20
Seattle(49) S30 .....9.10
S.Chicago,Ill. W14 ....7.65
SpringCity,Pa. K3 ....8.10
Struthers,O. Y1 .....7.65
Warren,O. C17 .....7.65
Waukegan,Ill. A7 .....7.65
Willimantic,Conn. J5 ..8.15
Youngstown F3, Y1 ....7.65

BARS, Cold-Finished Alloy
(Turned and Ground)

Cumberland,Md.(5) C19..6.55

BARS, Cold-Finished Alloy

Ambridge,Pa. W18 ....9.025
BeaverFalls,Pa. M12,R2 9.025
Bethlehem,Pa. B2 .....9.025
Bridgeport,Conn. C32 ..9.175
Buffalo B5 .....9.025
Camden,N.J. P13 .....9.20
Canton,O. T7 .....9.025
Carnegie,Pa. C12 .....9.025
Chicago W18 .....9.025
Cleveland A7, C20 ....9.25
Detroit B5, P17 .....9.225
Detroit H5, S41 .....9.025
Donora,Pa. A7 .....9.025
Elyria,O. W8 .....9.025
FranklinPark,Ill. N5 ..9.025
Gary,Ind. R2 .....9.025
GreenBay,Wis. F7 .....9.025
Hammond,Ind. J5, L2..9.025
Hartford,Conn. R2 ....9.325
Harvey,Ill. R5 .....9.025
Lackawanna,N.Y. B3 ..9.025
LosAngeles P2, S30 ...11.00
Mansfield,Mass. B5 ...9.325
Massillon,O. R2, R8 ....9.025
Midland,Pa. C18 .....9.025
Monaca,Pa. S17 .....9.025
Newark,N.J. W18 .....9.20
Plymouth,Mich. P5 ....9.225

S.Chicago,Ill. W14 ....9.025
SpringCity,Pa. K3 .....9.20
Struthers,O. Y1 .....9.025
Warren,O. C17 .....9.025
Waukegan,Ill. A7 ....9.025
Willimantic,Conn. J5 ..9.325
Worcester,Mass. A7 ...9.325
Youngstown F3, Y1 ...9.025

BARS, Reinforcing, Billet (To Fabricators)

AlabamaCity,Ala. R2 ..5.675
Atlanta A11 .....5.00
Birmingham C15 .....5.25
Buffalo R2 .....5.675
Cleveland R2 .....5.675
Ecorse,Mich. G5 .....5.675
Emeryville,Calif. J7 ..6.425
Fairfield,Ala. T2 ....5.675
Fairless,Pa. U5 .....5.825
Fontana,Calif. K1 ....6.375
Ft.Worth,Tex.(26) T4 ..5.50
Gary,Ind. U5 .....5.675
Houston S5 .....5.675
Ind.Harbor,Ind. I-2, Y1.5.675
Johnstown,Pa. B2 .....5.675
Joliet,Ill. P22 .....5.675
KansasCity,Mo. S5 ....5.675
Kokomo,Ind. C16 .....5.775
Lackawanna,N.Y. B2...5.675
LosAngeles B3 .....6.375
Madison,Ill. L1 .....5.875
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 .....6.375
Pittsburg,Calif. C11 ..6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 ....6.425
SandSprings,Okla. S5 ..5.675
Seattle A24, B3, N14 ..6.425
S.Chicago,Ill. R2, W14.5.675
S.Duquesne,Pa. U5 ....5.675
S.SanFrancisco B3 ....6.425
SparrowsPoint,Md. B2 .5.675
Steelton,Pa. B2 .....5.675
Sterling,Ill. (1) N15 ..5.675
Sterling,Ill. N15 .....5.775
Struthers,O. Y1 .....5.675
Tonawanda,N.Y. B12 ...6.10
Torrance,Calif. C11 ...6.375
Youngstown R2, U5 ..5.675

BARS, Reinforcing, Billet (Fabricated: to Consumers)

Baltimore B2 .....7.42
Boston B2, U8 .....8.15
Chicago U8 .....7.41
Cleveland U8 .....7.39
Johnstown,Pa. B2 .....7.33
Lackawanna,N.Y. B2 ..7.35
Marion,O. P11 .....6.70
Newark,N.J. U8 .....7.80
Philadelphia U8 .....7.63
Pittsburgh J5, U8 .....7.35
SandSprings,Okla. S5 ..7.35
Seattle A24, B3, N14 ..7.95
SparrowsPoint,Md. B2 ..7.33
St.Paul U8 .....8.17
Williamsport,Pa. S19 ..7.25

BARS, Wrought Iron

Economy,Pa.(S.R.)B14 15.10
Economy,Pa.(D.R)B14 19.30
Econ.(DirectRolled)B14 13.55
Economy(Staybolt)B14 19.80
McK.Rks.(S.R.) L5 ...14.50
McK.Rks.(D.R.) L5 ...19.80
McK.Rks.(Staybolt)L5 .20.95

BARS, Rail Steel

ChicagoHts.(3) C2, I-2 5.575
ChicagoHts.(4) (44) I-2.5.675
ChicagoHts.(4) C2 ....5.675
Franklin,Pa.(3) F5 ...5.575
Franklin,Pa.(4) F5 ...5.675
JerseyShore,Pa.(3) J8 ..5.55
Marion,O.(3) P11 ....5.575
Tonawanda(3) B12 ....5.575
Tonawanda(4) B12 ....6.10

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

AlabamaCity,Ala. R2 ..5.10
Allenport,Pa. P7 .....5.10
Aliquippa,Pa. J5 .....5.10
Ashland,Ky.(8) A10 ....5.10
Cleveland J5, R2 .....5.10
Conshohocken,Pa. A3 ..5.15
Detroit(8) M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Fairless,Pa. U5 .....5.15
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 ....5.825
Gary,Ind. U5 .....5.10
Geneva,Utah C11 .....5.20
GraniteCity,Ill.(8) G4 ..5.20
Ind.Harbor,Ind. I-2, Y1.5.10
Irvin,Pa. U5 .....5.10
Lackawanna,N.Y. B2 ..5.10
Mansfield,O. E6 .....5.10
Munhall,Pa. U5 .....5.10
Newport,Ky. A2 .....5.10
Niles,O. M21, S3 .....5.10
Pittsburg,Calif. C11 ....5.80
Pittsburgh J5 .....5.10
Portsmouth,O. P12 ....5.10
Riverdale,Ill. A1 .....5.10
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. U5, W14..5.10
SparrowsPoint,Md. B2 .5.10
Steubenville,O. W10 ....5.10
Warren,O. R2 .....5.10
Weirton,W.Va. W6 ....5.10
Youngstown U5, Y1 ....5.10

SHEETS, H.R. (19 Ga. & Lighter)

Niles,O. M21, S3 .....6.275

SHEETS, H. R. Alloy

Gary,Ind. U5 .....8.40
Ind.Harbor,Ind. Y1 ....8.40
Irvin,Pa. U5 .....8.40
Munhall,Pa. U5 .....8.40
Newport,Ky. A2 .....8.40
Youngstown U5, Y1 ....8.40

SHEETS, H.R. (14 Ga. & Heavier) High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....7.525
Ashland,Ky. A10 .....7.525
Cleveland J5, R2 .....7.525
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.525
Fairfield,Ala. T2 .....7.525
Fairless,Pa. U5 .....7.575
Farrell,Pa. S3 .....7.525
Fontana,Calif. K1 .....8.25
Gary,Ind. U5 .....7.525
Ind.Harbor,Ind. I-2, Y1 7.525
Irvin,Pa. U5 .....7.525
Lackawanna(35) B2 ..7.525
Munhall,Pa. U5 .....7.525
Niles,O. S3 .....7.525
Pittsburgh J5 .....7.525
S.Chicago,Ill. U5, W14.7.525
Sharon,Pa. S3 .....7.525
SparrowsPoint(36) B2..7.525
Warren,O. R2 .....7.525
Weirton,W.Va. W6 ....7.525
Youngstown U5, Y1 ...7.525

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10 ...5.35
Cleveland R2 .....5.875
Warren,O. R2 .....5.875

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 .....7.05
Middletown,O. A10 ....6.775
Warren,O. R2 .....7.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

AlabamaCity,Ala. R2 ..6.275
Aliquippa,Pa. J5 .....6.275
Allenport,Pa. P7 .....6.275
Cleveland J5, R2 .....6.275
Conshohocken,Pa. A3 ..6.325
Detroit M1 .....6.275
Ecorse,Mich. G5 .....6.275
Fairfield,Ala. T2 .....6.275
Fairless,Pa. U5 .....6.325
Follansbee,W.Va. F4 ..6.275
Fontana,Calif. K1 .....7.40
Gary,Ind. U5 .....6.275
GraniteCity,Ill. G4 ....6.375
Ind.Harbor,Ind. I-2, Y1 6.275
Irvin,Pa. U5 .....6.275
Lackawanna,N.Y. B2 ..6.275
Mansfield,O. E6 .....6.275
Middletown,O. A10 ....6.275
Newport,Ky. A2 .....6.275
Pittsburg,Calif. C11 ..7.225
Pittsburgh J5 .....6.275
Portsmouth,O. P12 ....6.275
SparrowsPoint,Md. B2..6.275
Steubenville,O. W10 ...6.275
Warren,O. R2 .....6.275
Weirton,W.Va. W6 ....6.275
Yorkville,O. W10 .....6.275
Youngstown Y1 .....6.275

SHEETS, Cold-Rolled, High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....9.275
Cleveland J5, R2 .....9.275
Ecorse,Mich. G5 .....9.275
Fairless,Pa. U5 .....9.325
Fontana,Calif. K1 ....10.40
Gary,Ind. U5 .....9.275
Ind.Harbor,Ind. I-2, Y1 9.275
Lackawanna(38) B2 ..9.275
Pittsburgh J5 .....9.275
SparrowsPoint(33) B2..9.275
Warren,O. R2 .....9.275
Weirton,W.Va. W6 ....9.275
Youngstown Y1 .....9.275

SHEETS, Culvert

	Cu Steel	Cu Fe
Ala.City,Ala. R2	7.125	....
Ashland,Ky. A10	7.225	7.475
Canton,O. R2	7.125	....
Fairfield,Ala. T2	7.125	7.375
Gary,Ind. U5	7.125	7.375
GraniteCity,Ill.G4	7.325	....
Ind.Harbor I-2	7.225	7.425
Irvin,Pa. U5	7.125	7.375
Kokomo,Ind. C16	7.325	....
MartinsFry. W10	7.125	7.375
Pitts.,Calif. C11	7.875	....
Pittsburgh J5	7.125	....
SparowsPt. B2	7.225	....
Weirton W6	7.125	....

SHEETS, ENAMELING

Ashland,Ky. A10 .....6.775
Cleveland R2 .....6.775
Fairfield,Ala. T2 .....6.775
Gary,Ind. U5 .....6.775
Ind.Harbor,Ind. I-2, Y1 6.775
Irvin,Pa. U5 .....6.775
Middletown,O. A10 ....6.775
Niles,O. M21, S3 .....6.775
SparrowsPoint,Md. B2..6.775
Youngstown Y1 .....6.775

BLUED STOCK, 29 Gage

Dover,O. E6 .....8.70
Ind.Harbor,Ind. I-2 ....8.70
Mansfield,O. E6 .....8.70
Warren,O. R2 .....8.70
Yorkville,O. W10 .....8.70

SHEETS, Culvert—Pure Iron

Ind.Harbor,Ind. I-2 ....7.475

SHEETS, Long Terne, Steel

Follansbee,W.Va. W10 .7.225
Gary,Ind. U5 .....7.225
Mansfield,O. E6 .....7.225
Middletown,O. A10 ....7.225
Niles,O. M21, S3 .....7.225
Warren,O. R2 .....7.225

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....7.625

SHEETS, Aluminum Coated

Butler,Pa. A10 (type 1) 9.525
Butler,Pa. A10 (type 2) 9.625
Irvin,Pa. U5 (type 1) ..9.525

SHEETS, Well Casing

Fontana,Calif. K1 ....7.325
Geneva,Utah C11 .....6.80

SHEETS, Galvanized High-Strength, Low-Alloy

Irvin,Pa. U5 .....10.125
Pittsburgh J5 .....10.125
SparrowsPt.(39) B2 ..10.025

SHEETS, Galvannealed Steel

Canton,O. R2 .....7.175
Irvin,Pa. U5 .....7.175

SHEETS, Galvanized Ingot Iron (Hot-Dipped Continuous)

Ashland,Ky. A10 .....7.125
Middletown,O. A10 ....7.125

SHEETS, Electrogalvanized

Canfield,O. C3 .....7.50
Cleveland (28) R2 ....7.65
Niles,O. (28) R2 .....7.65
Weirton,W.Va. W6 .....7.50

SHEETS, Galvanized Steel Hot-Dipped§

AlabamaCity,Ala. R2..6.875‡
Ashland,Ky. A10 ....6.875‡
Canton,O. R2 .....6.875‡
Dover,O. E6 .....6.875†
Fairfield,Ala. T2 ....6.875†
Gary,Ind. U5 .....6.875†
GraniteCity,Ill. G4 ...6.975*
Ind.Harbor,Ind. I-2 ..6.875†
Irvin,Pa. U5 .....6.875†
Kokomo,Ind. C16 ....6.975‡
MartinsFerry,O. W10..6.875*
Middletown,O. A10 ..6.875†
Pittsburg,Calif. C11 ..7.625*
Pittsburg J5 .....6.875†
SparrowsPt.,Md. B2 ..6.875†
Warren,O. R2 .....6.875†
Weirton,W.Va. W6 ..6.875*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous. §For minimum spangled add 0.15c.

Key to Producers

A1 Acme Steel Co.
A2 Acme-Newport Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A24 Alaska Steel Mills Inc.
A25 Algoma Steel Corp. Ltd.
B1 Babcock & Wilcox
B2 Bethlehem Steel Co.
B3 Bethlehem Steel Co., Pacific Coast Div.
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.
C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C3 Canfield Steel Co.
C4 Carpenter Steel Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co., Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.
C32 Carpenter Steel of N.Eng.
D2 Detroit Steel Corp.
D4 Disston Div., H. K. Porter Co. Inc.
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.
E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E6 Empire-Reeves Steel
E10 Enamel Prod. & Plating
F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.
G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
G8 Green River Steel Corp.
H1 Hanna Furnace Corp.
H5 Hercules Drawn Steel
H7 Helical Tube Co.
I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins Steel Tube Works
I-7 Indiana Steel & Wire Co.
J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.
K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.
L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L6 Lone Star Steel Co.
L7 Lukens Steel Co.
L8 Leschen Wire Rope Div., H. K. Porter Co. Inc.
M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M14 McInnes Steel Co.
M16 Md. Fine & Specialty Wire Co. Inc.
M17 Metal Forming Corp.
M18 Milton Steel Div., Merritt-Chapman&Scott
M21 Mallory-Sharon Metals Corp.
M22 Mill Strip Products Co.
M23 Mill Strip Products Co. of Pennsylvania
N1 National-Standard Co.
N2 National Supply, Armco Steel Corp.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N14 Northwest. Steel Rolling Mills Inc.
N15 Northwestern S.&W. Co.
N20 Neville Ferro Alloy Co.
O4 Oregon Steel Mills
P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke&Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Div., Detroit Steel Corp.
P13 Precision Drawn Steel
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., American Chain & Cable
P17 Plymouth Steel Corp.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.
P24 Phil. Steel & Wire Corp.
R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R8 Reliance Div., Eaton Mfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.
S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Div., Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw&Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Div., Copperweld Steel Co.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Div., Bliss & Laughlin Inc.
S40 Seneca Steel Service
S41 Stainless & Strip Div., J & L Steel Corp.
S42 Southern Elec. Steel Co.
S43 Seymour Mfg. Co.
S44 Screw & Bolt Corp. of America
S45 Somers Brass Co.
S46 Steel Co. of Canada
T2 Tenn. Coal & Iron Div., U. S. Steel Corp.
T3 Tenn. Products & Chemical Corp.
T4 Texas Steel Co.
T5 Thomas Strip Div., Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.
U3 Union Wire Rope, Armco Steel Corp.
U4 Universal-Cyclops Steel
U5 U. S. Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div., U. S. Steel Corp.
U11 Union Carbide Metals Co.
U13 Union Steel Corp.
V2 Vanadium-Alloy Steel
V3 Vulcan-Kidd Steel Div., H. K. Porter Co.
W1 Wallace Barnes Steel Div., Associated Spring
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.
Y1 Youngstown Sheet & Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2	5.10
Allenport,Pa. P7	5.10
Alton,Ill. L1	5.30
Ashland,Ky.(8) A10	5.10
Atlanta A11	5.10
Bessemer,Ala. T2	5.10
Birmingham C15	5.10
Conshohocken,Pa. A3	5.15
Detroit M1	5.10
Ecorse,Mich. G5	5.10
Fairfield,Ala. T2	5.10
Farrell,Pa. S3	5.10
Fontana,Calif. K1	5.825
Gary,Ind. U5	5.10
Ind.Harbor,Ind. I-2, Y1	5.10
Johnstown,Pa.(25) B2	5.10
Lackaw'na,N.Y.(25) B2	5.10
LosAngeles(25) B3	5.85
LosAngeles C1	8.60
Minnequa,Colo. C10	6.20
Riverdale,Ill. A1	5.10
SanFrancisco S7	6.60
Seattle(25) B3	6.10
Seattle N14	6.60
Sharon,Pa. S3	5.10
S.Chicago,Ill. W14	5.10
S.SanFrancisco(25) B3	5.85
SparrowsPoint,Md. B2	5.10
Torrance,Calif. C11	5.85
Warren,O. R2	5.10
Weirton,W.Va. W6	5.10
Youngstown U5, Y1	5.10

STRIP, Hot-Rolled Alloy

Carnegie,Pa. S18	8.40
Farrell,Pa. S3	8.40
Gary,Ind. U5	8.40
Houston S5	8.65
Ind.Harbor,Ind. Y1	8.40
KansasCity,Mo. S5	8.65
LosAngeles B3	9.60
Lowellville,O. S3	8.40
Newport,Ky. A2	8.40
Sharon,Pa. A2, S3	8.40
S.Chicago,Ill. W14	8.40
Youngstown U5, Y1	8.40

STRIP, Hot-Rolled High-Strength, Low-Alloy

Ashland,Ky. A10	7.575
Bessemer,Ala. T2	7.575
Conshohocken,Pa. A3	7.575
Ecorse,Mich. G5	7.575
Fairfield,Ala. T2	7.575
Farrell,Pa. S3	7.575
Gary,Ind. U5	7.575
Ind.Harbor,Ind. I-2, Y1	7.575
Lackawanna,N.Y. B2	7.575
LosAngeles(25) B3	8.325
Seattle(25) B3	8.575
Sharon,Pa. S3	7.575
S.Chicago,Ill. W14	7.575
S.SanFrancisco(25) B3	8.325
SparrowsPoint,Md. B2	7.575
Warren,O. R2	7.575
Weirton,W.Va. W6	7.575
Youngstown U5, Y1	7.575

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10	5.35
Warren,O. R2	5.875

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6	7.425
Baltimore T6	7.425
Boston T6	7.975
Buffalo S40	7.425
Cleveland A7	7.425
Dearborn,Mich. S3	7.425
Detroit D2, M1, P20	7.425
Dover,O. G6	7.425
Evanston,Ill. M22	7.425
Farrell,Pa. S3	7.425
Follansbee,W.Va. W10	7.425
Fontana,Calif. K1	9.20
Franklin Park,Ill. T6	7.425
Ind.Harbor,Ind. Y1	7.425
Indianapolis S41	7.575
LosAngeles C1, S41	9.30
McKeesport,Pa. E10	7.525
NewBedford,Mass. R10	7.875
NewBritain,Conn. S15	7.875
NewCastle,Pa. B4, M23	7.425
NewHaven,Conn. D2	7.875
NewKensington,Pa. A6	7.425
Pawtucket,R.I. R3, N8	7.975
Philadelphia P24	7.875
Riverdale,Ill. A1	7.425
Rome,N.Y.(32) R6	7.425
Sharon,Pa. S3	7.425
Trenton,N.J.(31) R5	8.875
Warren,O. R2, T5	7.425
Worcester,Mass. A7	7.975
Youngstown Y1	7.425
Youngstown S41	7.425

STRIP, Cold-Rolled Alloy

Boston T6	15.90
Carnegie,Pa. S18	15.55
Cleveland A7	15.55
Dover,O. G6	15.55
Farrell,Pa. S3	15.55
Franklin Park,Ill. T6	15.55
Harrison,N.J. S18	15.55
Indianapolis S41	15.70
LosAngeles S41	17.75
Lowellville,O. S3	15.55
Pawtucket,R.I. S8	15.90
Riverdale,Ill. A1	15.55
Sharon,Pa. S3	15.55
Worcester,Mass. A7	15.85
Youngstown S41	15.55

STRIP, Cold-Rolled High-Strength, Low-Alloy

Cleveland A7	10.80
Dearborn,Mich. S3	10.80
Dover,O. G6	10.80
Farrell,Pa. S3	10.80
Ind.Harbor,Ind. Y1	10.80
Sharon,Pa. S3	10.80
Warren,O. R2	10.80
Weirton,W.Va. W6	10.80
Youngstown Y1	10.80

STRIP, Galvanized (Continuous)

Farrell,Pa. S3	7.50
Sharon,Pa. S3	7.50

STRIP, Cold-Finished Spring Steel (Annealed)

	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Anderson,Ind. G6	9.10	....	....	....	....
Baltimore T6	9.50	10.70	12.90	15.90	18.85
Boston T6	9.50	10.70	12.90	15.90	18.85
Bristol,Conn. W1	....	10.70	12.90	16.10	19.30
Carnegie,Pa. S18	8.95	10.40	12.60	15.60	....
Cleveland A7	8.95	10.40	12.60	15.60	18.55
Dearborn,Mich. S3	9.05	10.50	12.70	....	....
Detroit D2	9.05	10.50	12.70	15.70	....
Dover,O. G6	8.95	10.40	12.60	15.60	18.55
Evanston,Ill. M22	9.05	10.40	12.60	15.60	....
Farrell,Pa. S3	8.95	10.40	12.60	15.60	18.55
Fostoria,O. S1	10.05	10.40	12.60	15.60	....
FranklinPark,Ill. T6	9.05	10.40	12.60	15.60	18.55
Harrison,N.J. C18	....	....	12.90	16.10	19.30
Indianapolis S41	9.10	10.55	12.60	15.60	18.55
LosAngeles C1	11.15	12.60	14.80	17.80	....
LosAngeles S41	11.15	12.60	14.80	....	....
NewBritain,Conn. S15	9.40	10.70	12.90	15.90	18.85
NewCastle,Pa. B4, M23	8.95	10.40	12.60	15.60	....
NewHaven,Conn. D2	9.40	10.70	12.90	15.90	....
NewKensington,Pa. A6	8.95	10.40	12.60	15.60	....
NewYork W3	....	10.70	12.90	16.10	19.30
Pawtucket,R.I. N8	9.50	10.70	12.90	15.90	18.85
Riverdale,Ill. A1	9.05	10.40	12.60	15.60	18.55
Rome,N.Y. R6	8.95	10.40	12.60	15.60	18.55
Sharon,Pa. S3	8.95	10.40	12.60	15.60	18.55
Trenton,N.J. R5	....	10.70	12.90	15.90	18.85
Warren,O. T5	8.95	10.40	12.60	15.60	18.55
Worcester,Mass. A7, T6	9.50	10.70	12.90	15.90	18.85
Youngstown S41	8.95	10.40	12.60	15.60	18.55

Spring Steel (Tempered)	Up to 0.80C	0.81-1.05C	1.06-1.35C
Bristol,Conn. W1	18.85	22.95	27.80
Buffalo W12	18.85	....	....
Fostoria,O. S1	19.05	22.15	....
FranklinPark,Ill. T6	19.20	23.30	28.15
Harrison,N.J. C18	18.85	22.95	27.80
NewYork W3	18.85	22.95	27.80
Palmer,Mass. W12	18.85	....	....
Trenton,N.J. R5	18.85	22.95	27.80
Worcester,Mass. A7, T6	18.85	22.95	27.80
Youngstown S41	19.20	23.30	28.15

STRIP, C.R., Electrogalvanized

Cleveland A7	7.425*
Dover,O. G6	7.425*
Evanston,Ill. M22	7.525*
McKeesport,Pa. E10	7.50*
NewCastle,Pa. M23	7.425*
Riverdale,Ill. A1	7.525*
Warren,O. B9, S3, T5	7.425*
Worcester,Mass. A7	7.975
Youngstown S41	7.425*

Plus galvanizing extras.

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2	8.175

TIGHT COOPERAGE HOOP

Atlanta A11	5.825
Farrell,Pa. S3	5.525
Riverdale,Ill. A1	5.675
Sharon,Pa. S3	5.525
Youngstown U5	5.525

TIN MILL PRODUCTS

TIN PLATE, Electrolytic (Base Box)

	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$9.10	$9.35	$9.75
Fairfield,Ala. T2	9.10	9.35	9.75
Fairless,Pa. U5	9.10	9.35	9.75
Fontana,Calif. K1	9.75	10.00	10.40
Gary,Ind. U5	9.10	9.35	9.75
GraniteCity,Ill. G4	9.20	9.45	9.85
IndianaHarbor,Ind. I-2, Y1	9.10	9.35	9.75
Irvin,Pa. U5	9.10	9.35	9.75
Niles,O. R2	9.10	9.35	9.75
Pittsburg,Calif. C11	9.75	10.00	10.40
SparrowsPoint,Md. B2	9.10	9.35	9.75
Weirton,W.Va. W6	9.10	9.35	9.75
Yorkville,O. W10	9.10	9.35	9.75

ELECTROLYTIC TIN-COATED SHEET (Dollars per 100 lb)

Aliquippa,Pa. J5 (21-27 Ga.)	7.90	8.10	....
IndianaHarbor,Ind. Y1 (20-27 Ga.)	7.90	....	....
Niles,O. R2 (20-27 Ga.)	7.90	8.10	8.30

ELECTROLYTIC THIN TIN PLATE (¼ lb coating in coils)

	Base Box 45 lb	50 lb	55 lb	60 lb
Fairfield,Ala. T2	$6.10	$6.25	$6.40	$6.55
Fairless,Pa. U5	6.10	6.25	6.40	6.55
Gary,Ind. U5	6.10	6.25	6.40	6.55
IndianaHarbor,Ind. I-2	6.10	6.25	6.40	6.55
Irvin,Pa. U5	6.10	6.25	6.40	6.55
SparrowsPoint,Md. B2	6.10	6.25	6.40	6.55
Weirton,W.Va. W6	6.10	6.25	6.40	6.55

TIN PLATE,Hot Dipped 1.25 1.50

Common Coke	lb	lb
Aliquippa,Pa. J5	$10.40	$10.65
Fairfield,Ala. T2	10.40	10.65
Fairless,Pa. U5	10.40	10.65
Fontana,Calif. K1	11.05	11.30
Gary,Ind. U5	10.40	10.65
Irvin,Pa. U5	10.40	10.65
Pitts.,Calif. C11	11.05	11.30
Sp.Pt.,Md. B2	10.40	10.65
Weirton,W.Va. W6	10.40	10.65
Yorkville,O. W10	10.40	10.65

BLACK PLATE (Base Box)

Aliquippa,Pa. J5	$8.20
Fairfield,Ala. T2	8.20
Fairless,Pa. U5	8.20
Fontana,Calif. K1	8.85
Gary,Ind. U5	8.20
GraniteCity,Ill. G4	8.30
Ind.Harbor,Ind. I-2, Y1	8.20
Irvin,Pa. U5	8.20
Niles,O. R2	8.20
Pittsburg,Calif. C11	8.85
SparrowsPoint,Md. B2	8.20
Weirton,W.Va. W6	8.20
Yorkville,O. W10	8.20

HOLLOWARE ENAMELING (Black Plate) (29 Gage)

Aliquippa,Pa. J5	7.85
Gary,Ind. U5	7.85
GraniteCity,Ill. G4	7.95
Ind.Harbor,Ind. Y1	7.85
Irvin,Pa. U5	7.85
Yorkville,O. W10	7.85

SILICON STEEL

C.R. COILS & CUT LENGTHS (22 Ga.)

Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	....	11.70	12.40	13.35	14.65
Brackenridge,Pa. A4	....	....	12.40	13.55	14.65
GraniteCity,Ill. G4	9.975*	11.30*	12.00*	13.15*	....
IndianaHarbor,Ind. I-2	9.875*	11.20*	11.90*	13.05*	....
Mansfield,O. E6	9.875*	11.70	12.40	13.55	14.65
Newport,Ky. A2	9.875	11.70*	12.40*	13.55*	14.65*
Niles,O. M21	9.875*	11.70	12.40	13.55	....
Vandergrift,Pa. U5	9.875*	11.70	12.40	13.55	14.65
Warren,O. R2	9.875*	11.70	12.40	13.55	14.65
Zanesville,O. A10	....	11.70†	12.40	13.55	14.65

	Stator
Mansfield,O. E6	8.10
Vandergrift,Pa. U5	8.10
Warren,O R2 (Locore)	8.10

SHEETS (22 Ga., coils & cut lengths)

Fully Processed (Semiprocessed ½c lower)	T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	15.70	16.30	16.80	17.85
Zanesville,O. A10	15.70	16.30	16.80	17.85
Vandergrift,Pa. U5	15.70	16.30	16.80	17.85

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge,Pa. A4	....	18.10	19.70	20.20	20.70	15.70††
Butler,Pa. A10	....	....	19.70	20.20	20.70	....
Vandergrift,Pa. U5	17.10	18.10	19.70	20.20	20.70	15.70
Warren,O. R2	....	....	....	....	....	15.70‡

*Semiprocessed. †Fully processed only. ‡Coil annealed; semiprocessed ½c lower. ††Coils only.

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2	8.00
Aliquippa,Pa. J5	8.00
Alton,Ill. L1	8.20
Atlanta A1	8.00
Bartonville,Ill. K4	8.10
Buffalo W12	8.00
Chicago W13	8.00
Cleveland A7, C20	8.00
Crawfordsville,Ind. M8	8.10
Donora,Pa. A7	8.00
Duluth A7	8.00
Fairfield,Ala. T2	8.00
Fostoria,O.(24) S1	8.10
Houston S5	8.25
Jacksonville,Fla. M8	8.35
Johnstown,Pa. B2	8.00
Joliet,Ill. A7	8.00
KansasCity,Mo. S5	8.25
Kokomo,Ind. C16	8.10
LosAngeles B3	8.95
Minnequa,Colo. C10	8.25
Monessen,Pa. P7, P16	8.00
Palmer,Mass. W12	8.30
Pittsburg,Calif. C11	8.95
Portsmouth,O. P12	8.00
S.Chicago,Ill. R2	8.00
S.SanFrancisco C10	8.95
SparrowsPoint,Md. B2	8.10
Sterling,Ill.(1) N15	8.00
Sterling,Ill. N15	8.10
Struthers,O. Y1	8.00
Waukegan,Ill. A7	8.00
Worcester,Mass. A7	8.30

WIRE, Cold Heading Carbon

Elyria,O. W8	8.00

WIRE, Gal'd., for ACSR

Bartonville,Ill. K4	12.65
Buffalo W12	13.40
Cleveland A7	12.65
Donora,Pa. A7	12.65
Duluth A7	12.65
Johnstown,Pa.(10) B2	12.65
KansasCity,Mo. U3	12.90
LosAngeles(2) B3	13.60
Minnequa,Colo. C10	12.775
Monessen,Pa. P7, P16	12.65
Muncie,Ind. I-7	13.60
NewHaven,Conn. A7	12.95
PalmerMass. W12	13.70
Pittsburg,Calif. C11	13.45
Portsmouth,O. P12	12.65
Roebling,N.J. R5	12.95
SparrowsPt.Md.,(10)B2	12.75
Struthers,O. Y1	13.40
Trenton,N.J. A7	12.95
Waukegan,Ill. A7	12.65
Worcester,Mass. A7	12.95

WIRE, Upholstery Spring

Aliquippa,Pa. J5	9.75
Alton,Ill. L1	9.95
Buffalo W12	9.75
Cleveland A7	9.75
Donora,Pa. A7	9.75
Duluth A7	9.75
Johnstown,Pa. B2	9.75
KansasCity,Mo. S5, U3	10.00
Kokomo,Ind. C16	9.85
LosAngeles B3	10.70
Minnequa,Colo. C10	9.95
Monessen,Pa. P7, P16	9.75
NewHaven,Conn. A7	10.95
Palmer,Mass. W12	10.05
Pittsburg,Calif. C11	10.075
Portsmouth,O. P12	9.75
Roebling,N.J. R5	10.05
S.Chicago,Ill. R2	9.75
S.SanFrancisco C10	10.70
SparrowsPt.,Md. B2	9.85
Struthers,O. Y1	9.75
Trenton,N.J. A7	10.05
Waukegan,Ill. A7	9.75
Worcester,Mass. A7	10.05

WIRE, MB Spring, High-Carbon

Aliquippa,Pa. J5	9.75
Alton,Ill. L1	9.95
Bartonville,Ill. K4	9.85
Buffalo W12	9.75
Cleveland A7	9.75
Donora,Pa. A7	9.75
Duluth A7	9.75
Fostoria,O. S1	9.80
Johnstown,Pa. B2	9.75
KansasCity,Mo. S5, U3	10.00
LosAngeles B3	10.70
Milbury,Mass.(12) N6	10.05
Minnequa,Colo. C10	9.95
Monessen,Pa. P7, P16	9.75
Muncie,Ind. I-7	9.95
Palmer,Mass. W12	10.05
Pittsburg,Calif. C11	10.70
Portsmouth,O. P12	9.75
Roebling,N.J. R5	10.05
S.Chicago,Ill. R2	9.75
S.SanFrancisco C10	10.70
SparrowsPt.,Md B2	9.85
Struthers,O. Y1	9.75
Trenton,N.J. A7	10.05
Waukegan,Ill. A7	9.75
Wor'ster,Mass.A7,J4,T6	10.05

WIRE, Fine & Weaving (8" Coils)

Alton,Ill. L1	16.50
Bartonville,Ill. K4	16.40
Chicago W13	16.30
Cleveland A7	16.30
Crawfordsville,Ind. M8	16.40
Fostoria,O. S1	16.30
Houston S5	16.55
Jacksonville,Fla. M8	16.65
Johnstown,Pa. B2	16.30
KansasCity,Mo. S5	16.55
Kokomo,Ind. C16	16.30
Minnequa,Colo. C16	16.55
Monessen,Pa. P16	16.30
Muncie,Ind. I-7	16.50
Palmer,Mass. W12	16.60
S.SanFrancisco C10	17.15
Waukegan,Ill. A7	16.30
Worcester,Mass. A7, J6	16.60

ROPE WIRE (A)

Bartonville,Ill. K4	13.45
Buffalo W12	13.45
Fostoria,O. S41	13.45
Johnstown,Pa. B2	13.45
Monessen,Pa. P7	13.45
Muncie,Ind. I-7	13.65
Palmer,Mass. W12	13.75
Portsmouth,O. P12	13.45
Roebling,N.J. R5	13.75
St.Louis L8	13.45
SparrowsPt.,Md. B2	13.55
Struthers,O. Y1	13.45
Worcester,Mass. J4	13.75

(A) Plow and Mild Plow; add 0.25c for Improved Plow.

WIRE, Tire Bead

Bartonville,Ill. K4	....17.15
Monessen,Pa. P16	....17.15
Roebling,N.J. R5	....17.65

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	....12.35
Baltimore T6	....12.65
Boston T6	....12.65
Buffalo W12	....12.35
Chicago W13	....12.45
Cleveland A7	....12.35
Crawfordsville,Ind. M8	.12.35
Dover,O. G6	....12.35
Evanston,Ill. M22	....12.45
Farrell,Pa. S3	....12.35
Fostoria,O. S1	....12.35
FranklinPark,Ill. T6	..12.45
Kokomo,Ind. C16	....12.35
Massillon,O. R8	....12.35
Milwaukee C23	....12.55
Monessen,Pa. P7, P16	..12.35
NewCastle,Pa. M23	...12.35
Palmer,Mass. W12	...12.65
Pawtucket,R.I. N8	....12.65
Philadelphia P24	....12.65
Riverdale,Ill. A1	....12.45
Rome,N.Y. R6	....12.35
Sharon,Pa. S3	....12.35
Trenton,N.J. R5	....12.65
Warren,O. B9	....12.35
Worcester,Mass. A7, T6	.12.65

NAILS, Stock Sizes — **Col.**

AlabamaCity,Ala. R2	...173
Aliquippa,Pa. J5	...173
Atlanta A11	...173
Bartonville,Ill. K4	...175
Chicago W13	...173
Cleveland A9	...173
Crawfordsville,Ind. M8	..175
Donora,Pa. A7	...173
Duluth A7	...173
Fairfield,Ala. T2	...173
Houston S5	...178
Jacksonville,Fla. M8	...175
Johnstown,Pa. B2	...173
Joliet,Ill. A7	...173
KansasCity,Mo. S5	...178
Kokomo,Ind. C16	...175
Minnequa,Colo. C10	...178
Monessen,Pa. P7	...173
Pittsburg,Calif. C11	...192
Rankin,Pa. A7	...173
S.Chicago,Ill. R2	...173
SparrowsPt.,Md. B2	...175
Sterling,Ill.(7) N15	...175
Worcester,Mass. A7	...179

(To Wholesalers: per cwt)

Galveston,Tex. D7	..$10.30

NAILS, CUT (100 lb kegs)

Wheeling,W.Va. W10	'$10.10

POLISHED STAPLES — **Col.**

AlabamaCity,Ala. R2	...175
Aliquippa,Pa. J5	...173
Atlanta A11	...173
Bartonville,Ill. K4	...175
Crawfordsville,Ind. M8	..177
Donora,Pa. A7	...173
Duluth A7	...173
Fairfield,Ala. T2	...173
Houston S5	...180
Jacksonville,Fla. M8	...177
Johnstown,Pa. B2	...173
Joliet,Ill. A7	...173
KansasCity,Mo. S5	...180
Kokomo,Ind. C16	...177
Minnequa,Colo. C10	...178
Pittsburg,Calif. C11	...194
Rankin,Pa. A7	...173
S. Chicago,Ill. R2	...175
SparrowsPt.,Md. B2	...175
Sterling,Ill.(7) N15	...175
Worcester,Mass. A7	...179

TIE WIRE, Automatic Baler

(14½ Ga.) per 97 lb net box)
Coil No. 3150

AlabamaCity,Ala. R2	..$8.78
Atlanta A11	....10.36
Bartonville,Ill. K4	....8.88
Buffalo W12	....10.26
Chicago W13	....9.24
Crawfordsville,Ind. M8	..8.88
Donora,Pa. A7	....8.78
Duluth A7	....8.78
Fairfield,Ala. T2	....8.78
Houston S5	....9.02
Jacksonville,Fla. M8	...8.88
Johnstown,Pa. B2	....8.78
Joliet,Ill. A7	....8.78
KansasCity,Mo. S5	...9.02
Kokomo,Ind. C16	....8.88
LosAngeles B3	....9.20
Minnequa,Colo. C10	...8.02
Pittsburg,Calif. C11	*....9.20*
S.Chicago,Ill. R2	....8.78
S.SanFrancisco C10	...9.94
SparrowsPt.,Md. B2	....8.88
Sterling,Ill.(37) N15	...8.88

Coil No. 6500 Stand.
100 lb coil

AlabamaCity,Ala. R2	..$9.06
Atlanta A11	....10.70
Bartonville,Ill. K4	....9.16
Buffalo W12	....10.60
Chicago W13	....9.54
Crawfordsville,Ind. M8	..9.16
Donora,Pa. A7	....9.06
Duluth A7	....9.06
Fairfield,Ala. T2	....9.06
Houston S5	....9.30
Jacksonville,Fla. M8	...9.16
Johnstown,Pa. B2	....9.06
Joliet,Ill. A7	....9.06
KansasCity,Mo. S5	....9.30
Kokomo,Ind. C16	....9.16
Los Angeles B3	....9.50
Minnequa,Colo. C10	...9.30
Pittsburg,Calif. C11	*....9.50*
S.Chicago,Ill. R2	....9.06
S.SanFrancisco C10	...10.26
SparrowsPt.Md. B2	....9.16
Sterling,Ill.(37) N15	....9.16

Coil No. 6500 Interim
100 lb coil

AlabamaCity,Ala. R2	..$9.11
Atlanta A11	....10.75
Bartonville,Ill. K4	....9.21
Buffalo W12	....10.65
Chicago W13	....9.59
Crawfordsville,Ind. M8	..9.21
Donora,Pa. A7	....9.11
Duluth A7	....9.11
Fairfield,Ala. T2	....9.11
Houston S5	....9.35
Jacksonville,Fla. M8	...9.21
Johnstown,Pa. B2	....9.11
Joliet,Ill. A7	....9.11
KansasCity,Mo. S5	....9.35
Kokomo,Ind. C16	....9.21
LosAngeles B3	....9.55
Minnequa,Colo. C10	...9.35
Pittsburg,Calif. C11	*....9.55*
S.Chicago,Ill. R2	....9.11
S.SanFrancisco C10	...10.31
SparrowsPt.,Md. B2	....9.21
Sterling,Ill.(37) N15	....9.21

BALE TIES, Single Loop — **Col.**

AlabamaCity,Ala. R2	...212
Atlanta A11	...212
Bartonville,Ill. K4	...214
Crawfordsville,Ind. M8	..214
Donora,Pa. A7	...212
Duluth A7	...212
Fairfield,Ala. T2	...212
Houston S5	...217
Jacksonville,Fla. M8	...214
Joliet,Ill. A7	...212
KansasCity,Mo. S5	...217
Kokomo,Ind. C16	...214
Minnequa,Colo. C10	...217
SparrowsPt.,Md. B2	...214
Sterling,Ill.(7) N15	...214

FENCE POSTS — **Col.**

Birmingham C15	...177
ChicagoHts.,Ill. C2, I-2.	.177
Duluth A7	...177
Franklin,Pa. F5	...177
Johnstown,Pa. B2	...177
Marion,O. P11	...177
Minnequa,Colo. C10	...182
Tonawanda,N.Y. B12	...177

WIRE, Barbed — **Col.**

AlabamaCity,Ala. R2	..193**
Aliquippa,Pa. J5	....190§
Atlanta A11	....197*
Bartonville,Ill. K4	199
Crawfordsville,Ind. M8	198
Donora,Pa. A7	....193†
Duluth A7	....193†
Fairfield,Ala. T2	....193†
Houston S5	....198**
Jacksonville,Fla. M8	...198
Johnstown,Pa. B2	....196§
Joliet,Ill. A7	....193†
KansasCity,Mo. S5	...196**
Kokomo,Ind. C16	....195†
Minnequa,Colo. C10	...198**
Monessen,Pa. P7	....196§
Pittsburg,Calif. C11	....213†
Rankin,Pa. A7	....193†
S.Chicago,Ill. R2	...193**
SparrowsPoint,Md. B2	..198§
Sterling,Ill.(7) N15	198

WIRE (16 gage)	**An'ld Galv. Stone**	**Galv. Stone**
Ala.City,Ala.R2	17.85	19.40**
Ali'ppa,Pa. J5	..17.85	19.65
Bartonville K4	..17.95	19.80
Chicago W13	....17.85	....
Cleveland A7	....17.85	....
Craw'sville M8	17.95	19.80†‡
Fostoria,O. S1	..18.35	19.90†
Houston S5	....18.10	19.65**
Jacksonville M8	17.95	19.80†‡
Johnstown B2	..17.85	19.65§
Kan.City,Mo. S5	18.10	....
Kokomo C16	...17.95	19.50†
Minnequa C10	..18.10	19.65**
F'lm'r,Mass.W12	18.10	19.70†
Pitts.Calif. C11	18.20	19.75†
S.SanFran. C10	18.20	19.75**
SparrowsPt. B2	..17.95	19.75§
St'ling(37) N15	..17.95	19.80
Waukegan A7	..17.85	19.40†
Worcester A7	....18.15	....

WOVEN FENCE, 9-15 Ga. Col.

Ala.City,Ala. R2	....187**
Aliq'ppa,Pa.9-11½ga.J5	190§
Atlanta A11	....191*
Bartonville,Ill. K4	193
Crawfordsville,Ind. M8	..192
Donora,Pa. A7	....187†
Duluth A7	....187†
Fairfield,Ala. T2	....187†
Houston S5	....192**
Jacksonville,Fla. M8	192
Johnstown,Pa.(42) B2	..190§
Joliet,Ill. A7	....187†
KansasCity,Mo. S5	....192**
Kokomo,Ind. C16	....189†
Minnequa,Colo. C10	...192**
Pittsburg,Calif. C11	...210†
Rankin,Pa. A1	....187†
S.Chicago,Ill. R2	....187**
Sterling,Ill.(7) N15	192

WIRE, Merchant Quality

6 to 8 gage	**An'ld Galv.**
Ala.City,Ala. R2	.9.00 9.55**
Aliquippa J5	....8.65 9.325§
Atlanta(48) A11	..9.00 9.75*
Bartonville(48) K4	9.85 19.90
Buffalo W12	....9.00 9.55†
Chicago W13	....9.00 9.55**
Cleveland A7	....9.00 ....
Crawfordsville M8	9.10 9.80††
Donora,Pa. A7	...9.00 9.55†
Duluth A7	....9.00 9.55†
Fairfield T2	....9.00 9.55
Houston(48) S5	..9.25 9.80**
Jack'ville,Fla. M8	9.10 9.80†‡
Johnstown(48) B2	9.00 9.675§
Joliet,Ill. A7	....9.00 9.55†
KansasCity(48)S5	9.25 9.80**
Kokomo(48) S16	..9.10 9.65†
LosAngeles B3	..9.95 10.625§
Minnequa C10	...9.25 9.80**
Monessen(48) P7	.8.65 9.35§
Palmer,Mass. W12	9.30 9.85†
Pitts.,Calif. C11	9.95 10.50†
Rankin,Pa. A7	....9.00 9.55†
S.Chicago R2	...9.00 9.55**
S.SanFran. C10	.9.95 10.50**
Spar'wsPt.(48)B2	9.10 9.775§
St'ling(37)(48)N15	.9.10 9.80
Struthers,O. Y1	..9.00 9.65‡
Worcester,Mass.A7	9.30 9.85†

Based on zinc prices of: *13.50c. †5c. §10c. ‡Less than 10c. ††10.50c. ‡‡11.10c. **Subject to zinc equalization extras.

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great.

Structural ½ in. larger 12.85 7/16 in. and smaller by 6 in. and shorter: 15% off list.

FASTENERS

(Consumer discounts per cent off list prices, orders for 1 container for assorted sizes; for less than container quantities, add 25 per cent; attaching nuts to bolts, package sizes, add 7.5 per cent: heavy hex nuts 1⅛ in. through 1½ in. tapped 8 threads, add 10 per cent)

HEX HEAD CAP SCREWS, coarse, or fine thread, packaged or bulk, with or without hex nuts, 1020 steel bright and high carbon heat treated. ¼ in. thru 1 in. diam., listed lengths:

Hot Galvanized and Zinc Plated:

Packaged	39.25
Bulk	46

BOLTS, Standard stock sizes:

Plain Finish	50

Hot Galvanized and Zinc Plated:

Packaged	39.25
*Bulk	46

*Hot galvanized or zinc plated lag bolts only—for package or bulk quantities use applicable list less bulk discounts.

CAP AND SETSCREWS,

Fillister Head, Cap Screws, Coarse Thread:

Packaged	+55
Bulk	+16

Flat Head Cap Screws:

¾ in. and smaller, 6 in. and shorter:	
Packaged	+85
Bulk	+38

Setscrews, Square Head, Cup Point, Coarse Thread:

Through 1 in. diam., 6 in. and shorter:	
Packaged	+ 5
Bulk	19
Through 1 in. diam., longer than 6 in.:	
Packaged	+29

HEXAGON NUTS: American Standard: Finished hex, hex jam, and hex slotted coarse or fine thread, ¼ in. through 3 in., finished hex thick, thick and slotted, castle, fine thread, ¼ in. through 1½ in., semifinished hex heavy, heavy and jam, heavy and slotted, coarse thread, ¼ in. through 4 in., and

SQUARE NUTS, American Standard: Regular square and heavy square, coarse thread, ¼ in. through 2 in.: Plain Finish 50

Hot Galvanized and Zinc Plated:

Packaged	39.25
Bulk	46

PRESTRESSED STRAND

(High strength, stress relieved; 7 wire uncoated. Net prices per 1000 ft, 40,000 lb and over)

	Standard Diameter, Inches				
	1/4	5/16	3/8	7/16	1/2
Buffalo W12	$26.20	$38.50	$47.90	$61.30	$80.30
KansasCity,Mo. U3	26.20	38.50	47.90	61.30	80.30
Minnequa,Colo. C10	26.20	38.50	47.90	61.30	80.30
Pittsburg,Calif. C11	26.20	38.50	47.90	61.30	80.30
Roebling,N.J. R5	26.20	38.50	47.90	61.30	80.30
SparrowsPoint,Md. B2	26.20	38.50	47.90	61.30	80.30
St.Louis L8	26.20	38.50	47.90	61.30	80.30
Waukegan,Ill. A7	26.20	38.50	47.90	61.30	80.30

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut length 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	27.24	23.12
1¼	13	....	32.25	24.41
1½	13	30.42	35.65	26.98
1¾	13	35.94	42.12	31.89
2	13	40.28	47.21	35.74
2¼	13	45.36	58.17	40.26
2½	12	49.24	57.72	43.70
2½	12	54.23	63.57	48.13
2¾	12	58.73	68.83	52.13
3	12	62.62	73.40	55.59

RAILWAY MATERIALS

Rails	Standard No. 1	Standard No. 2	All No. 2	Tee Rails 60 lb Under
Bessemer,Pa. U5	5.75	5.65	....	6.725
Ensley,Ala. T2	5.75	5.65	....	6.725
Fairfield,Ala. T2	....	....	....	6.725
Gary,Ind. U5	5.75	5.65	....	....
Huntington,W.Va. C15	....	....	....	6.725
Johnstown,Pa. B2	....	....	....	(16)6.725
Lackawanna,N.Y. B2	5.75	5.65	....	6.725
Minnequa,Colo. C10	5.75	5.65	....	7.225
Steelton,Pa. B2	5.75	5.65	....	....
Williamsport,Pa. S19	....	....	....	6.725

TIE PLATES

Fairfield,Ala. T2	....6.875
Gary,Ind. U5	....6.875
Lackawanna,N.Y. B2	..6.875
Minnequa,Colo. C10	..6.875
Seattle B3	....7.025
Steelton,Pa. B2	....6.875
Torrance,Calif. C11	....7.025

JOINT BARS

Bessemer,Pa. U5	....7.25
Fairfield,Ala. T2	....7.25
Joliet,Ill. U5	....7.25
Lackawanna,N.Y. B2	..7.25
Minnequa,Colo. C10	....7.25
Steelton,Pa. B2	....7.25

AXLES

Ind.Harbor,Ind. S13	...9.125
Johnstown,Pa. B2	....9.125

SCREW SPIKES

Lebanon,Pa. B2	....15.10

TRACK BOLTS, Untreated

Cleveland R2	....15.35
KansasCity,Mo. S5	....15.35
Lebanon,Pa. B2	....15.35
Minnequa,Colo. C10	...15.35
Pittsburgh S44	....15.35
Seattle B3	....15.85

STANDARD TRACK SPIKES

Fairfield,Ala. T2	....10.10
Ind.Harbor,Ind. I-2, Y1	.10.10
KansasCity,Mo. S5	....10.10
Lebanon,Pa. B2	....10.10
Minnequa,Colo. C10	...10.10
Pittsburgh J5	....10.10
Seattle B3	....10.60
S.Chicago,Ill. R2	....10.10
Struthers,O. Y1	....10.10
Youngstown R2	....10.10

FOOTNOTES

(1) Chicago base.
(2) Double galvanized.
(3) Merchant.
(4) Reinforcing.
(5) 1⅛ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in.; 6.70c; 1 15/16 to 8 in., inclusive, 7.05c.
(6) Limited analyses only.
(7) Chicago base 2 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(10) Bethany A coating.
(12) Worcester, Mass., base.
(15) ⅜" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(23) Special quality.
(24) Deduct 0.05c, finer than 15 Ga.
(25) Bar mill bands.
(26) Dold in mill zone, 5.65c.
(27) Bar mill sizes.
(28) Bonderized.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝ in.; 7.375c, for widths ⅝ in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) 14 Ga., 48 in.
(35) 72" and narrower.
(36) 54" and narrower.
(37) Chicago base, 10 points lower.
(38) 13 Ga. & lighter; 60" & narrower.
(39) 48" and narrower.
(43) 9-14½ Ga.
(44) To fabricators.
(48) 6-7 Ga.
(49) 3½ in., and smaller rounds and 2½ in. and smaller hexagons; 9.65c for larger rounds and hexagons and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Ambridge, Pa. N2	+12.25	....	+5.75	....	+3.25	....	+1.75	....	+1.75	....	+2	....	0.5	....
Lorain, O. N3	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Youngstown Y1	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

ELECTRICWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	¼		⅜		½		⅝		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Alton, Ill. L1	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Benwood, W. Va. W10	1.5	+27	+10.5	+36	+21	+45.5	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Butler, Pa. F6	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Fairless, Pa. N3	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Fontana, Calif. K1	....	....	....	....	....	....	+10.75	+28	+7.75	+24	+4.25	+19.5	+1.75	+18.25
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	1.25	+16	4.25	+12	7.75	+7.5	10.25	+6.25
Lorain, O. N3	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sharon, Pa. S4	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sparrows Pt., Md. B2	2.5	+26	+10.5	+36	+21.5	+46	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Wheatland, Pa. W9	4.5	+24	+8.5	+34	+19.5	+44	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Youngstown R2, Y1	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.75		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Alton, Ill. L1	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Benwood, W. Va. W10	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Etna, Pa. N2	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Fairless, Pa. N3	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Fontana, Calif. K1	+1.25	+17.25	+0.75	+16.75	0.75	+16.5	0.75	+16.5	+9.75	+27.5	+9.75	+27.5
Indiana Harbor, Ind. Y1	10.75	+5.25	11.25	+4.75	12.75	+4.5	12.75	+4.5	2.25	+15.5	2.25	+15.5
Lorain, O. N3	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sharon, Pa. M6	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Sparrows Pt., Md. B2	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Wheatland, Pa. W9	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Youngstown R2, Y1	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5

*Galvanized pipe discounts based on price of zinc at 11.50c, East St. Louis.

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	Rerolling: Ingot	Rerolling: Slabs	Forging Billets	H.R. Strip	H.R. Rods; Bars; C.F. Wire	Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	22.75	25.00	....	36.00	....	43.50	39.25	48.50	45.00
202	24.75	28.25	37.75	39.00	42.25	44.50	40.00	49.25	49.25
301	24.00	26.00	38.75	37.25	43.50	46.00	41.25	51.25	47.50
302	26.25	29.50	39.50	40.50	44.25	46.75	42.25	52.00	52.00
302B	26.50	30.75	42.25	45.75	46.75	49.00	44.50	57.00	57.00
303	....	33.25	42.50	....	47.25	49.75	45.00	56.75	56.75
304	28.00	29.50	39.50	40.50	44.25	46.75	45.75	52.00	52.00
304L	....	37.25	47.25	48.25	52.00	54.50	53.50	59.75	59.75
305	29.50	34.75	44.00	47.50	47.00	49.50	46.25	58.75	58.75
308	32.00	36.25	49.00	50.25	54.75	57.75	55.25	63.00	63.00
309	41.25	47.50	60.00	64.50	66.25	69.50	66.00	80.50	80.50
310	51.50	59.50	81.00	84.25	89.75	94.50	87.75	96.75	96.75
314	....	....	80.50	....	89.75	94.50	87.75	....	104.25
316	41.25	47.50	64.50	68.50	71.75	75.75	71.75	80.75	80.75
316L	....	55.25	72.25	76.25	79.50	83.50	79.50	88.50	88.50
317	49.75	58.00	79.75	88.25	89.50	94.25	88.50	101.00	101.00
321	33.50	38.00	48.75	53.50	54.50	57.50	54.75	65.50	65.50
330	....	....	123.25	....	98.75	143.75	135.00	149.25	149.25
18-8 CbTa	38.50	48.25	57.75	63.50	63.75	67.25	64.75	79.25	79.25
403	....	....	26.75	....	29.75	31.50	30.00	40.25	40.25
405	20.25	26.50	30.75	36.00	34.75	36.50	32.50	46.75	46.75
410	17.50	19.50	26.75	31.00	29.75	31.50	30.00	40.25	40.25
416	....	....	29.75	....	33.75	35.50	31.25	48.25	48.25
420	....	31.50	35.50	41.75	40.75	42.75	40.25	62.00	62.00
430	17.75	19.75	29.75	32.00	33.75	35.50	31.00	40.75	40.75
430F	....	....	30.50	....	34.25	36.00	31.75	51.75	51.75
431	....	29.75	39.25	....	43.50	46.00	41.00	56.00	56.00
446	....	....	40.75	59.00	46.00	48.25	42.75	70.00	70.00

Producers Are: Allegheny Ludlum Steel Corp.; American Steel & Wire Div., U. S. Steel Corp.; Anchor Drawn Steel Co., division of Vanadium-Alloys Steel Co.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; A. M. Byers Co.; Calstrip Steel Corp.; G. O. Carlson Inc.; Carpenter Steel Co.; Carpenter Steel Co. of New England; Charter Wire Products; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Firth Sterling Inc.; Fort Wayne Metals Inc.; Green River Steel Corp., subsidiary of Jessop Steel Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Ellwood Ivins Steel Tube Works Inc.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Stainless & Strip Div., Jones & Laughlin Steel Corp.; Joslyn Stainless Steels, division of Joslyn Mfg. & Supply Co.; Latrobe Steel Co.; Lukens Steel Co.; Maryland Fine & Specialty Wire Co. Inc.; McLouth Steel Corp.; Metal Forming Corp.; Midvale-Heppenstall Co.; National Standard Co.; National Tube Div., U. S. Steel Corp.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Riverside-Alloy Metal Div., H. K. Porter Company Inc.; Rodney Metals Inc.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Somers Brass Co.; Specialty Wire Co. Inc.; Standard Tube Co.; Superior Steel Div., Copperweld Steel Co.; Superior Tube Co.; Swepco Tube Corp.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co., subsidiary of Crucible Steel Co. of America; Tube Methods Inc.; Ulbrich Stainless Steels, Inc.; Union Steel Corp.; U. S. Steel Corp.; Universal Cyclops Corp.; Vanadium-Alloys Steel Co.; Wall Tube & Metal Products Co.; Wallingford Steel, subsidiary of Allegheny Ludlum Steel Corp.; Washington Steel Corp.; Seymour Mfg. Co.

Clad Steel

	Plates: Carbon Base 5%	Plates: Carbon Base 10%	Plates: Carbon Base 15%	Plates: Carbon Base 20%	Sheets: Carbon Base 20%
Stainless					
302	....	....	....	....	37.50
304	26.05	28.80	31.55	34.30	39.75
304L	30.50	33.75	36.95	40.15	....
316	38.20	42.20	46.25	50.25	58.25
316L	42.30	46.75	51.20	55.65	....
316 Cb	49.90	55.15	60.40	65.65	....
321	31.20	34.50	37.75	41.05	47.25
347	36.90	40.80	44.65	48.55	57.00
405	22.25	24.60	26.90	29.25	....
410	20.55	22.70	24.85	27.00	....
430	21.20	23.45	25.65	27.90	....
Inconel	49.80	61.35	72.80	84.40	....
Nickel	43.20	55.05	66.95	78.90	....
Nickel, Low Carbon	43.50	55.70	67.95	80.35	....
Monel	44.25	55.35	66.45	77.60	....

	Strip, Carbon Base —Cold Rolled— 10%	Strip, Carbon Base —Cold Rolled— Both Sides
Copper*	36.10	43.00

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. P4; Coatesville, Pa. L7; New Castle, Ind. I-4, and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Reg. Carbon (W-1)	0.330	Hi-Carbon-Cr (D-11)	0.955
Spec. Carbon (W-1)	0.385	V-Cr Hot Work (H-13)	0.550
Oil Hardening (O-1)	0.505	W-Cr Hot Work (H-12)	0.530
V-Cr Hot Work (H-11)	0.505	W Hot Wk (H-21)	1.425-1.44

Grade by Analysis (%) W	Cr	V	Co	Mo	AISI Designation	$ per lb
18	4	1	....	....	T-1	1.840
18	4	2	....	....	T-2	2.005
13.5	4	3	....	....	T-3	2.105
18.25	4.25	1	4.75	....	T-4	2.545
18	4	2	9	....	T-5	2.915
20.25	4.25	1.6	12.95	....	T-6	4.330
13.75	3.75	2	5	....	T-8	2.485
1.5	4	1	....	8.5	M-1	1.200
6.4	4.5	1.9	....	5	M-2	1.345
6	4	3	....	6	M-3	1.590

Tool steel producers include: A4, A8, B2, B8, C4, C9, C12, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

Pig Iron

Prices in dollars per gross ton, f.o.b. (rail) furnace; add 50 cents when shipped by truck. Maximum delivered prices are approximate and based on rail shipment.

	Basic	No. 2 Foundry	Malle-able	Besse-mer
Birmingham District				
Birmingham R2	62.00	62.50**	66.50	....
Birmingham U6	....	62.50**	66.50	....
Woodward, Ala. W15	62.00*	62.50**	66.50	....
Cincinnati, deld.	....	70.20	....	....
Buffalo District				
Buffalo H1, R2	66.00	66.50	67.00	67.50
N. Tonawanda, N.Y. T9	....	66.50	67.00	67.50
Tonawanda, N.Y. W12	66.00	66.50	67.00	67.50
Boston, deld.	77.29	77.79	78.29	....
Rochester, N.Y., deld.	69.02	69.52	70.02	....
Syracuse, N.Y., deld.	70.12	70.62	71.12	....
Chicago District				
Chicago I-3	66.00	66.50	66.50	67.00
S. Chicago R2	66.00	66.50	66.50	67.00
S. Chicago, Ill. W14	66.00	....	66.50	67.00
Milwaukee, deld.	68.81	69.31	69.31	69.81
Muskegon, Mich., deld.	....	74.46	74.46	....
Cleveland District				
Cleveland R2, A7	66.00	66.50	66.50	67.00
Akron, Ohio, deld.	69.52	70.02	70.02	70.52
Mid-Atlantic District				
Birdsboro, Pa. B10	68.00	68.50	69.00	69.50
Chester, Pa. P4	Nom.	Nom.	Nom.	....
Swedeland, Pa. A3	68.00	68.50	69.00	69.50
NewYork, deld.	....	75.41	75.91	....
Newark, N.J., deld.	72.53	73.03	73.53	74.03
Philadelphia, deld.	70.18	70.68	71.18	71.68
Troy, N.Y. R2	68.00	68.50	69.00	69.50
Boston, deld.	75.20	75.70	76.20	76.70
Pittsburgh District				
Neville Island, Pa. P6	66.00	66.50	66.50	67.00
Pittsburgh (N&S sides), deld.	....	....	68.31	68.31	68.81
Monaca, Pa., deld.	....	68.33	68.33	68.83
Lawrenceville, W. Homestead, Wilmerding, Pa., deld.	....	68.68	68.68	69.18
Verona, Trafford, Pa., deld.	68.83	69.33	69.33	69.83
Brackenridge, Pa., deld.	69.16	69.66	69.66	70.16
Midland, Pa. C18	66.00	....	....	....
Youngstown District				
Hubbard, Ohio Y1	....	....	66.50	....
Sharpsville, Pa. S6	66.00	....	66.50	67.00
Youngstown Y1	....	....	66.50	....

Other U. S. Districts	Basic	No. 2 Foundry	Malle-able	Besse-mer
Duluth I-3	66.00	66.50	66.50	67.00
Erie, Pa. I-3	66.00	66.50	66.50	67.00
Fontana, Calif. K1	75.00	75.50	....	....
Geneva, Utah C11	66.00	66.50	....	....
GraniteCity, Ill. G4	67.90	68.40	68.90	....
Ironton, Utah C11	66.00	66.50	....	....
Minnequa, Colo. C10	68.00	68.50	69.00	....
Rockwood, Tenn. T3	62.00	62.50‡	66.50	67.00
Toledo, Ohio I-3	66.00	66.50	66.50	67.00
Cincinnati, deld.	72.94	73.44	....	....
Mansfield, Ohio, deld.	....	....	71.34	....
Canadian District				
Hamilton, Ont. S46	65.00	65.00	65.50	....
PortColborne, Ont. A25	65.00	65.00	65.50	66.00
SaultSte. Marie, Ont. A25	65.00	65.00	65.50	66.00

*Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.
**Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.50.
‡Phos. 0.50% up; Phos. 0.30-0.49%, $63.50.

PIG IRON DIFFERENTIALS

Silicon: Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%.

Manganese: Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.01-6.50% silicon; add 75c for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 13%; starting with silicon over 13% add $1 per ton for each 0.50% silicon or portion thereof up to 14%; over 14%, price is $93 with $1 differential; add $1 for each 0.50% Mn over 1%)

Buffalo H1	$79.25
Jackson, Ohio I-3, J1	78.00
PortColborne, Ont. A25	78.50
Toledo, Ohio I-3	78.00

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.50% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

CalvertCity, Ky. P15	$99.00
NiagaraFalls, N.Y. P15	99.00
Keokuk, Iowa Open-hearth & Fdry, K2	89.00
Keokuk, Iowa O.H. & Fdry, 12½ lb pigiets, 16% Si, K2	92.00

LOW PHOSPHORUS PIG IRON, Gross Ton

Birdsboro, Pa. B10 (Phos. 0.075% max)	$73.00
Lyles, Tenn. T3 (Phos. 0.035% max)	73.00
Rockwood, Tenn. T3 (Phos. 0.035% max)	73.00
Buffalo H1 (Intermediate) (0.036-0.075% max)	71.50
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Duluth I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Erie, Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
NevilleIsland, Pa. P6 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Swedeland, Pa. A3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Troy, N.Y. R2 (Phos. 0.075% max)	73.00

Steel Service Center Products

Representative prices, cents per pound, f.o.b. warehouse, for 2000 lb orders. Prices will vary with total weight of the order. City delivery charges are 15 cents per 100 lb except: Denver, 20 cents; Baltimore, Boston, New York, Philadelphia, San Francisco, 10 cents; Atlanta, Birmingham, Dallas, Houston, Los Angeles, Seattle, no charge.

	SHEETS			STRIP	BARS				PLATES	
	Hot Rolled	Cold Rolled	Galv.	Hot Rolled	H.R. Rounds	C.F. Rounds	H.R. Alloy 4140	STRUCTURAL SHAPES	Carbon	Floor
Atlanta	9.37	10.61	11.85	10.85	9.53	13.24	....	9.94	9.73	11.16
Baltimore	9.20	9.61	10.06	11.25	9.65	11.70	16.38	9.85	9.60	11.10
Birmingham	8.46	10.20	10.59	10.41	8.26	13.14	16.65	8.47	8.41	10.05
Boston	9.74	10.58	11.77	12.16	9.77	13.35	16.69	10.16	9.62	11.08
Buffalo	8.55	9.30	11.25	11.00	8.75	11.45	16.30	9.15	8.65	11.10
Charlotte, N. C.	10.52	11.22	10.55	11.51	10.32	12.68	....	10.53	10.47	12.11
Chicago	9.22	10.20	10.70	11.39	9.22	10.65	15.95	9.57	9.06	11.35
Cincinnati	9.34	10.26	10.75	11.71	9.33	11.53	16.27	10.14	9.44	11.68
Cleveland	9.22	10.66	10.92	11.51	9.33	11.25	16.06	9.96	9.30	11.59
Dallas	10.57	10.05	11.75	12.13	9.98	12.98	16.95	10.21	9.81	11.18
Detroit	9.48	10.46	11.05	11.76	9.53	11.01	16.23	10.14	9.43	11.61
Denver	9.41	11.77	12.11	9.86	10.10	11.47	....	10.02	9.69	11.83
Houston	10.17	9.65	11.35	11.73	9.58	13.10	16.55	9.81	9.41	10.78
Indianapolis	9.66	10.64	11.14	11.83	9.66	11.09	16.39	10.01	9.50	11.79
Kansas City	9.21	10.87	11.35	10.87	9.31	11.57	15.72	9.80	9.10	....
Los Angeles	10.35	11.20	12.10	12.40	10.25	14.20	17.35	10.45	10.30	12.30
Memphis, Tenn.	9.63	10.35	10.80	11.29	9.48	12.70	16.53	9.67	9.32	11.18
Milwaukee	9.36	10.34	10.84	11.53	9.36	10.89	16.09	9.79	9.20	11.49
Moline, Ill.	9.62	10.60	11.10	11.79	9.62	11.05	16.40	9.97	9.46	11.75
Newark, N. J.	9.36	10.13	11.25	11.46	9.74	13.25	16.40	10.20	9.51	11.05
New York	9.36	10.13	11.35	11.46	9.74	13.25	16.40	10.20	9.51	11.00
Philadelphia	9.50	10.00	10.89	11.25	9.65	11.95	16.48	9.85	8.85	11.10
Pittsburgh	9.22	10.53	11.58	11.49	9.22	11.25	16.95	8.91	9.06	11.35
Portland, Oreg.	10.40	12.25	12.35	12.40	10.40	16.65	17.85	11.00	10.55	12.70
St. Louis	9.42	10.58	11.08	11.59	9.44	11.28	16.33	9.80	9.28	11.59
St. Paul	9.57	10.24	11.39	11.74	9.57	11.49	16.54	9.92	9.41	11.70
San Francisco	10.17	11.69	11.40	11.78	10.07	15.10	18.20	10.49	10.38	12.47
Seattle	11.35	12.45	13.40	12.80	10.80	10.20	17.80	11.59	10.95	13.60
Spokane, Wash.	11.20	12.30	13.25	12.65	10.65	16.20	17.85	11.35	10.80	13.01

Specifications: Hot rolled sheet, sheared edge, 10 Ga. & 36 x 96-120 in.; cold rolled sheets, 20 Ga. & 36 x 96-120 in.; galvanized sheets, 10 Ga. x 36 x 120 in. except Los Angeles, Dallas and Houston, 10 Ga. x 48 x 120 in.; hot rolled strip, ⅛ in. x 1 in.; hot rolled carbon bars, rounds, ¾ in.—1¼ in., M1020; cold finished bars, 1 in., C1018; hot rolled alloy bars, 4140 annealed, 1¾ in.—2¾ in. rounds; structural shapes, I beams, 6 x 12½ in.; carbon plates, sheared, through ½ in. x 84 in.; floor plates, ¼ in. x 36 in.

Refractories

Fire Clay Brick (per 1000 pieces*)

High-Heat Duty: Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Winburne, Snow Shoe, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo.; Ironton, Oak Hill, Parrall, Portsmouth, Ohio, Ottawa, Ill., Stevens Pottery, Ga., Canon City, Colo., $133; Templeton, Pa., $135; Salina, Pa., $138; Niles, Ohio, $139; Cutler, Utah, $175.

Super-Duty: Ironton, Ohio, Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Winburne, Snow Shoe, Pa., New Savage, Md., St. Louis, $200; Stevens Pottery, Ga., $210.

Silica Brick (per 1000 pieces*)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Pt. Matilda, Pa., Portsmouth, Ohio, Hawstone, Pa., St. Louis, $158; Warren, Niles, Windham, Ohio, Hays, Latrobe, Morrisville, Pa., $163; E. Chicago, Ind., Joliet, Rockdale, Ill., $168; Canon City, Colo., $173; Lehi, Utah, $183; Los Angeles, $185.

Semisilica Brick (per 1000 pieces*)

Woodbridge, N. J., Canon City, Colo., $133; Philadelphia, Cclearfield, Pa., $138.

Ladle Brick (per 1000 pieces*)

Dry-Pressed: Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Pa., Vandalia, Mo., New Salisbury, Ohio, $97; Vanport, Pa., Wellsville, Irondale, Ohio, $100; Clearfield, Pa., Portsmouth, Ohio, $102; St. Louis, Mexico, Mo., $120.

High-Alumina Brick (per 1000 pieces*)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., Danville, Ill., $250; Philadelphia, $265; Clearfield, Pa., $230; Orviston, Snow Shoe, Pa., $260.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $310; Danville, Ill., $313; Clearfield, Orviston, Snow Shoe, Pa., $320; Philadelphia, $325.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $350; Danville, Ill., $353; Clearfield, Orviston, Snow Shoe, Pa., $360; Philadelphia, $365.

Sleeves (per 1000)

St. Louis, $193; Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., $188; Ottawa, Ill., $205.

Nozzles (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $310.

Runners (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Clearfield, Pa., $234.

Dolomite (per net ton)

Domestic, dead-burned bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, Gibsonburg, Narlo, Ohio, $16.75; Thornton, McCook, Ill., $17; Dolly Siding, Bonne Terre, Mo., $15.00.

Magnesite (per net ton)

Domestic, dead-burned, ½ in. grains with fines: Chewelah, Wash., Luning, Nev., $46; ¾ in. grains with fines: Baltimore (periclase), $73; Pascagoula, Miss. (periclase), $90.

*—9 in. x 4½ x 2.50 straights.

Ores

Lake Superior Iron Ore

(Prices effective for the 1960 shipping season, subject to later revision, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Mesabi bessemer	$11.60
Lump ½ in. and up	12.85
Fines, under ½ in.	10.72
Mesabi nonbessemer	11.45
Old Range bessemer	11.85
Old Range nonbessemer	11.70
Open-hearth lump	12.70
High phos.	11.45

Based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 1, 1960; increases or decreases after that date are absorbed by the seller.

Eastern Local Iron Ore

New Jersey, concentrates ..... nom.

Foreign Iron Ore

Cents per unit

Swedish basic, 65%, c.i.f. Atlantic ports	25.00†
Chilean, 62-65%, c.i.f. Atlantic ports	22.00
Brazilian, (lump) 68.5%, f.o.b. vessel, Victoria, per ton	$11.50

Tungsten Ore

Net ton, unit

Foreign wolframite, good commercial quality	$15.50-16.00*
Domestic, concentrates, f.o.b. milling points	22.00-23.00

Manganese Ore

Mn 46-48%, Indian, 85-90c, nom. per long ton unit, c.i.f. U. S. ports, duty for buyer's account.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and Rhodesian

48% 3:1	$34.00-35.00†
48% no ratio	25.00-26.00†

South Africa Transvaal

44% no ratio	18.75
48% no ratio	24.00-26.00†

Turkish

48% 3:1	35.00-37.00†

Domestic

Rail nearest seller

18% 3:1	30.00

Molybdenum

Sulfide concentrate, per lb of Mo content, mines, unpacked $1.23

Antimony Ore

Per short ton unit of Sb content, c.i.f. seaboard

55-60%	$3.00-3.50
60-65%	3.60-4.00

Vanadium Ore

Cents per lb V_2O_5

Domestic	31.00

*Before duty. †Nominal.

Canadian Steel

(Cents per lb, f.o.b. mill, except as otherwise noted)

Billets, Blooms & Slabs:	
Carbon (N.T.):	
Forging	$97.00
Rerolling	78.00
Alloy (N.T.)	115.00
Wire Rods:	
Carbon	5.70
Alloy	6.40
Wire (carload lots):	
Merchant annealed	8.40
Low carbon indus.	7.20
Upholstery spring	8.55
M.B. spring	8.85
Bars & Small Shapes:	
Carbon, merchant	5.30
Carbon, special	5.85
Alloy	6.40
Bar Mill Bands:	
Carbon	5.40
Alloy	8.05
Bars, Reinforcing	5.30
Structural Shapes:	
Standard carbon	5.50
Angles & zees	5.40
Plates, Carbon:	
Sheared	5.45
Universal mill	5.10
Sheets & coils, Hot Rolled:	
Carbon sheet	4.95
Carbon strip	5.00
Sheets & Coils, Cold Rolled:	
Carbon sheet	6.35
Carbon strip:	
(0.080 and lighter)	6.35
(0.081 and heavier)	6.35
Sheets & Coils, Galvanized:	
Standard quality	6.70
Culvert quality	7.00
Sheets, Porcelain Enameling	7.45
Sheets & Coils, Electrical:	
Field grade	9.00
Electrical grade	10.15
Sheet Piling	6.15
Skelp	4.70
Rails, Heavy	5.55
Rails, Light	5.70
Joint Bars	6.55
Tie Plates	6.35
Grinding Balls (3 in. diam.)	7.00
Tin Mill Products (Per base box; 100 lb base wt)	
Coke tin plate (1.25 lb pot yield)	$10.60
Electrolytic tin plate (0.25 lb coating)	9.10
Black plate	8.30
Nails, Wholesale:	
Carload lots	Col. 110

Fluorspar

Metallurgical grades, f.o.b. shipping point in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $37-$41; 70%, $36-$40; 60% $33-$36.50. Imported, net ton, f.o.b. cars point of entry, duty paid, metallurgical grade; European, $30-$33, contract; Mexican, all rail, duty paid, $28-$28.50; barge, Brownsville, Tex., $30-$31.

Metal Powder

(Per pound f.o.b. shipping point in ton lots for minus 100 mesh, except as noted.)

	Cents
Sponge Iron, domestic and foreign, 98% Fe, min. truckiots, freight allowed east of Mississippi River:	
100 mesh, bags	11.50
100 mesh, pails	9.85‡
40 mesh, bags	8.10††
Electrolytic Iron,	
Melting stock, 99.9% Fe, irreg. fragments, ⅛ in. x 1.3 in.	28.75
(In contract lots of 750 tons price is 22.75c.)	
Annealed, 99.5% Fe.	36.75, ton del. east of Mississippi.
Unannealed (99+% Fe)	33.0
Unannealed (99+% Fe) (minus 325 mesh)	58.0
Carbonyl Iron: 90-99.9%, 3 to 20 microns, depending on grade, 88.00-700.00 in standard 200-lb containers; all minus 200 mesh.	
Aluminum: Atomized, 600-lb drum freight allowed, c.l. 39.80; ton lots	41.80
Brass, 80/20, leaded (60 mesh)	36.50
Bronze powder, 90/10.	54.20
Copper, all types	15.00*
Lead	7.50*
Manganese, minus 35 mesh	1.00
Nickel, all types	0.78-1.06
Nickel-Silver	57.90
Solder	7.00*
Stainless Steel, 304	89.00
Stainless Steel, 316	$1.07
Steel, AISI 4650	32.00
Tin	14.00*
Zinc	23.20
Cobalt:	Dollars
98.5%, minus 100-300 mesh	1.57-1.58
99.5%, below 5 microns	2.32
Tungsten	nom.
Molybdenum	4.35

*Plus cost of metal. †Depending on mesh. §Cutting and scarfing grades. **Depending on price of ore. ††Welding grade.

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, Pa., furnace	$14.75-15.25
Connellsville, Pa., foundry	18.00-18.50

Oven Foundry

Birmingham, ovens	$30.35
Cincinnati, deld.	33.34
Buffalo, ovens	32.00
Chattanooga, Tenn., ovens	30.80
Detroit, ovens	32.00
Pontiac, Mich., deld.	34.05
Saginaw, Mich., deld.	35.63
Erie, Pa., ovens	32.00
Indianapolis, ovens	31.25
Ironton, Ohio, ovens	30.50
Cincinnati, deld.	33.64
Kearny, N. J., ovens	31.25
Milwaukee, ovens	32.00
Neville Island (Pittsburgh), Pa., ovens	30.75
New Haven, Conn., ovens	31.00
Painesville, Ohio, ovens	32.00
Cleveland, deld.	34.45
Philadelphia, ovens	31.00
St. Louis, ovens	33.00
St. Paul, ovens	31.25
Chicago, deld.	34.78
Swedeland, Pa., ovens	31.00
Terre Haute, Ind., ovens	31.25

Imported Steel

(Base per 100 lb, landed, duty paid; based on current ocean rates with any rise for buyer's acc't. Source of shipment: Western Europe)

	North Atlantic	Great Lakes	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305	$5.80	$6.05	$5.75	$5.65	$5.95
Bar Size Angles	5.85	6.10	5.80	5.70	6.00
Structural Angles	5.75	6.00	5.70	5.60	5.90
I-Beams	5.70	5.95	5.65	5.55	5.85
Channels	5.70	5.95	5.65	5.55	5.85
Plates (basic bessemer)	5.45	5.80	5.50	5.40	5.70
Sheets, hot rolled and galvanized	Nom.	....	Nom.	Nom.	Nom.
Furring Channels, C.R., 1000 ft, ¾ x 0.30 lb per ft	25.20	24.70	24.40	24.40	25.20
Barbed Wire (†)	6.35	6.25	6.25	6.10	6.45
Merchant Bars	5.85	6.10	5.80	5.70	6.00
Hot-Rolled Bands	5.95	6.20	5.90	5.80	6.10
Wire Rods, Thomas No. 5 (Niederrhein)	5.80	5.85	5.75	5.75	6.00
Wire Rods, O.H., No. 5 (Niederrhein)	6.00	6.05	5.95	5.95	6.25
Bright Common Wire Nails (§)	6.80	7.05	6.75	6.65	6.95

†Per 82 lb net reel. §Per 100-lb keg, 20d nails and heavier.

Coal Chemicals

(Representative prices)

Cents per gal f.o.b. tank car or tank trucks, plant.

Pure benzene	34.00
Xylene, industrial grade	29.00
Creosote	24.00
Naphthalene, 78 deg.	6.00
Toluene, one deg. (deld. east of Rockies)	25.00

Cents per lb, f.o.b. tank cars or tank trucks, deld.

Phenol, 90 per cent grade	14.75

Per ton bulk, f.o.b. cars or trucks, plant.

Ammonium sulfate, regular grade	$32.00

Ferroalloys

MANGANESE ALLOYS

Spiegeleisen: Carlot, 10 lb pigs, per gross ton, Palmerton, Pa., 21-23% Mn, $102.50; 19-21% Mn, 1-3% Si, $100; 16-19% Mn $98. For Neville Island, Pa., prices add $2.50. Lump 35 lb and down: Deduct $2 from 10 lb pig prices at Palmerton.

Standard Ferromanganese: (Mn 74-76%, C 7% approx) base price per net ton, $220, Johnstown, Duquesne, Sheridan, Neville Island, Pa.; Alloy, W. Va.; Ashtabula, Marietta, O.; Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively (Min 79-81%). Lump $228 per net ton, f.o.b. Anaconda, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

High-Grade Low-Carbon Ferromanganese: (Mn 85-95%). Carload, lump, bulk, max 0.07% C, 35.1c per lb of contained Mn, carload packed 36.4c, ton lots 37.9c, less ton 39.1c. Delivered. Deduct 4c for max 0.15% C grade from above prices, 5.3c for max 0.03% C, 6.6c for max 0.5% C, and 8.1c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk, 24c per lb of contained Mn; packed, carload 25.3c, ton lot 26.9c, less ton 28.1c.

Electrolytic Manganese Metal: Min carload, bulk, 34.25c; 2000 lb to min carload, 37c; less ton, 39c; 50 lb cans, add 0.5c per lb. Premium for hydrogen-removed metal 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or any point east of Mississippi River; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%). Carload, lump, bulk, 1.50% C grade, 18.5-21% Si, 11.6c per lb of alloy. Packed, c.l. 12.8c, ton 13.25c, less ton 14.25c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Portland, Oreg. For 2% C grade, Si 16-18.5%, deduct 0.2c from above prices, For 3% grade, Si 12.5-16% deduct 0.5c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 5% max, C 0.10% max). Contract, ton lot, 2" x D, $1.50 per lb of contained Ti; less ton to 300 lb, $1. (Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lot $1.35, less ton to 300 lb $1.37, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract min c.l. $250 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and north of Baltimore and St. Louis. Spot, $255.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4%). Contract, c.l. $300 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed. Spot, $305.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: C.l. lump, bulk, 28.75c per lb of contained Cr. Delivered.

Charge Chrome: Cr 58-65%, C 5-7%, Si 4-6%, S 0.03% max., 20.00c per lb of contained Cr, carlots, lump, bulk, delivered.

Blocking Chrome: Cr 55-63%, C 4-6%, Si 8-12%, 23.50c per lb of contained Cr, delivered in carlots, lump, bulk.

Refined Chrome: Cr 58-65%, C 4.25% max., Si 1.0% max., S 0.03%, 21.00c per lb of contained Cr, carlots, lump, bulk, delivered.

Low-Carbon Ferrochrome (Simplex) Cr 63-66% or 68-71%: C 0.025% max., 31.50c; C 0.010% max., 32.50c per lb of contained Cr, carlots, lump, bulk, delivered.

Cr 68-73%: C 0.25% max., 33.00c. Cr 65-71%; C 0.06% max., 32.00c; C 0.10% max, 31.75c; C 0.20% max, 31.50c; C 0.50% max, 31.25c; C 1.0% max, 31.00c; C 1.5%, 30.75c; C 2.0% max, 30.50c, carlots, lump, bulk, delivered.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%, Si 7-10%). C. l., 2" x D, bulk 30.8c per lb of contained Cr. Packed, c.l. 32.4c, ton 34.2c, less ton 35.7c. Delivered. Spot, add 0.25c.

Foundry Ferrosilicon Chrome: (Cr 50-54%, Si 28-32%, C 1.25% max).8M x D, carload, bulk, 20.05c per lb of alloy, carload packed 21.25c, ton lot 22.50c, less ton lot 23.70c. Delivered. Spot, add 0.25c.

Ferrochrome-Silicon: Cr 39-41%, Si 42-45%, C 0.05% max, 22.50c per lb contained Cr and 14.60c per lb contained Si; Cr 33-36%, Si 45-48%, C 0.05% max, 22.50c per lb contained Cr, 14.60c per lb contained Si.

Chromium Metal, Electrolytic: Commercial grade (C 99.8% min, metallic basis Fe 0.2% max). Contract, carlot packed, 2" x D plate (above ⅛" thick) $1.15 per lb, ton lot $1.17, less ton lot $1.19. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open hearth grade (V 50-55%, Si 8% max, C 3% max). Contract, any quantity, $3.20 per lb of contained V. Delivered. Spot, add 10c. **Special Grade:** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.30. **High Speed Grade:** (V 50-55% or 70-75%, Si 1.50% max, C 0.20% max) $3.40.

Grainal: Vanadium Grainal No. 1, $1.05 per lb; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lot, packed, $1.38 per lb contained V_2O_5 freight allowed. Spot, add 5c.

SILICON ALLOYS

50% Ferrosilicon: Carload, lump, bulk, 14.6c per lb contained Si. Packed, c.l. 17.1c, ton lot 18.55, less ton 20.20c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Chattanooga, Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Keokuk, Iowa; Portland, Oreg. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.45c to 50% ferrosilicon prices.

65% Ferrosilicon: Carload, lump, bulk, 15.75c per lb contained silicon, Packed, c.l. 17.75c, ton lot 19.55c, less ton 20.9c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Carload, lump, bulk, 16.9c per lb of contained Si. Packed, c.l. 18.8c. ton lot 20.45c, less ton 21.7c. Delivered. Spot, add 0.3c.

90% Ferrosilicon: Carload, lump, bulk, 20c per lb of contained Si. Packed, c.l. 21.65c, ton lot 23.05, less ton 24.1c. Delivered. Spot, and 0.25c.

Silicon Metal: (98% min Si, 1.00% max Fe, 0.7% max Ca). C.l. lump, bulk, 21.5c per lb of Si. Packed, c.l. 23.15c, ton lot 24.45c, less ton 25.45c. Add 0.5c for max 0.03% Ca grade. Add 0.5c for 0.50% Fe grade analysing 98.25% min Si.

Alsifer: (Approx 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 9.85c per lb of alloy; ton lots, packed, 10.85c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l., lump, bulk, 9.25c per lb of alloy. Packed, c.l. 10.45c, ton lot 11.6c, less ton 12.45c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Carload, bulk, 26.25c per lb of alloy, carload, lump, packed 27.25c, ton lot 28.4c, less ton 29.65c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: 100 lb or more packed (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy; less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices 100 lb and over are as follows: Grade A (10-14% B) 85c per lb; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si). Carload, bulk, lump, or 3" x D, $5.25 per lb of contained B. Packed, carload, $5.40, ton to c.l. $5.50, less ton $5.60. Delivered.

Carbortam: (B 1 to 2%). Lump, carload $320 per ton, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Carload, lump, bulk 23c per lb of alloy, carload packed 24.25c, ton lot 26.15c, less ton 27.15c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.5-3%). Carload, lump, bulk 24c per lb of alloy, carload packed 25.65c, ton lot 27.95c, less ton 29.45c. Delivered. Spot, add 0.25c.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx 3½ lb each and containing 2 lb of Cr). Carload, bulk 19.60c per lb of briquet, in bags 20.70c; 3000 lb to c.l. pallets 20.80c; 2000 lb to c.l. in bags 21.90c; less than 2000 lb in bags 22.80c. Delivered. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx 3 lb and containing 2 lb of Mn). Carload, bulk 13.7c per lb of briquet; c.l. packed, bags 14.9c; 3000 lb to c.l., pallets 14.9c; 2000 lb to c.l., bags 16.1c; less ton 17c. Delivered. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx 3½ lb and containing 2 lb of Mn and approx ½ lb of Si). C.l. bulk 14c per lb briquet; c.l. packed, bags 15.2c; 3000 lb to c.l., pallets 15.2c; 2000 lb to c.l., bags 16.4c; less ton 17.3c. Delivered. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx 5 lb and containing 2 lb of Si and small sizes, weighing approx 2½ lb and containing 1 lb of Si). Carload bulk 8c per lb of briquet; packed, bags 9.2c; 3000 lb to c.l., pallets 9.6c; 2000 lb to c.l., bags 10.8c; less ton 11.7c. Delivered. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each). $1.49 per lb of Mo contained, f.o.b. Langeloth, Pa.

Titanium Briquets: Ti 98.27%, $1 per lb f.o.b. Niagara Falls, N. Y.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%). $5.25 per lb (all quantities) of contained W. Delivered.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Si 4% max, C 0.1% max). Ton lots 2" x D, $3.45 per lb of contained Cb; less ton lots $3.50 (nominal). Delivered.

Ferrotantalum Columbium: (Cb 44-47% approx, Ta 15% approx, and Cb plus Ta 60% min, C 0.30% max). Ton lots 2" x D, $3.05 per lb of contained Cb plus Ta, delivered; less ton lots, $3.10.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx). Carload, bulk 19.25c per lb of alloy, c.l. packed ½ in. x 12 M 20.00c, ton lot 21.15c, less ton 22.40c. Delivered. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 20c per lb of alloy, ton lot 21.15c; less ton lot 22.4c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

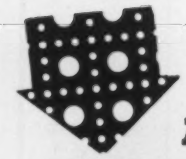
V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 18.45c per lb of alloy; ton lot 19.95c; less ton lot 21.20c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis

Siminal: (Approx 20% each Si, Mn, Al; bal Fe). Lump, carload, bulk, 19.25c. Packed c.l. 20.25c; 2000 lb to c.l. 21.25c; less than 2000 lb 21.75c per lb of alloy. Delivered.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $5 for each 1% of P above or below the base). Carload, bulk, f.o.b. sellers' works, Mt. Pleasant, Sigio, Tenn., $120 per gross ton.

Ferromolybdenum: (65-75%). Per lb of contained Mo in 2000-lb container, f.o.b. Langeloth and Washington, Pa., $1.76 in all sizes except powdered which is $1.82.

Technical Molybdic-Oxide: Per lb of contained Mo, in cans $1.47; in bags, $1.46, f.o.b. Langeloth and Washington, Pa.



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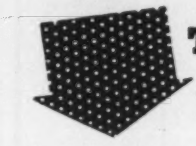

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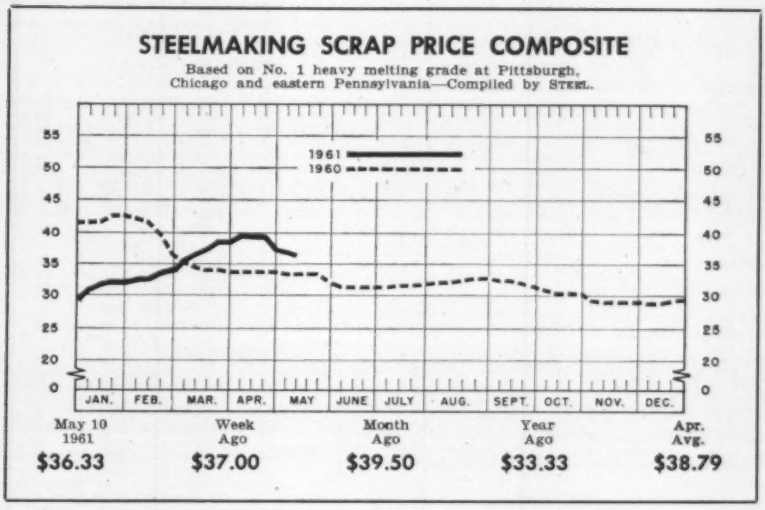


Scrap Price Sags as Buying Shrinks

STEEL's composite on No. 1 heavy melting drops another 67 cents a ton to $36.33 in face of rising steelmaking operations. Export support now less in evidence

Scrap Prices, Page 188

● **Chicago**—The market is quiet. Brokers report district steel mills are buying as much scrap today as they were two months ago, but increased availability is causing prices to decline. Although the steelmaking rate continues to rise, producers are using more blast furnace hot metal in their melts, and this is reflected in a drop of $1 a ton on the leading steelmaking grades. The cast iron grades are also quoted off $1.

● **Philadelphia**—The scrap market is unsettled and prices are easy. Based on small sales, No. 1 heavy melting is off to a spread of $38-$40, delivered; No. 2 heavy melting is $34-$35; and No. 2 bundles are $24. Machine shop turnings are down $1 to $14, and heavy turnings are nominal at $25. Low phos structurals and plates have declined to $43-$44, and couplers, springs, and wheels to $44.

General softness is attributed not only to slow domestic buying, but to an easier flow of yard scrap and relatively little new export trading. There is still a fairly good movement of tonnage abroad, but it's mostly against orders placed several weeks ago.

● **New York**—Dealers' buying prices are unchanged. Domestic consumption is light, but export demand is sufficient to sustain the market at present levels.

● **Pittsburgh**—Bids on New York Central Railroad scrap were off $2 to $3 a ton from last month's, and brokers predict that bids on the Pennsylvania Railroad's list will follow the same pattern. Prices on dealer grades of scrap are unchanged. It's thought the market has bottomed out. Some observers expect an uptrend toward the end of this month, because of better buying, or because new export contracts may draw scrap out of this district.

● **Cleveland** — While there isn't much buying, some mills have been taking small tonnage at the recently established levels, giving brokers and dealers reason to think the market has leveled out. Two Youngstown mills paid $38 for small lots of No. 1 heavy melting industrial steel. Not much change in the market is anticipated until monthend auto lists begin to close.

● **Detroit** — Although only small dealer-to-dealer transactions are reported, the market is steady. Brokers anticipate little change over the next couple of weeks. Steelmaking operations are still rising, but the percentage of blast furnace hot metal in open hearth melts is rising. Automotive bundled scrap generation is increasing.

● **Buffalo** — A leading consumer placed orders with local dealers for No. 1 heavy melting, No. 2 bundles, and turnings grades at prevailing prices. It was the first time this mill has purchased No. 1 steel in many months. The new orders tended to stabilize the local market despite weakness elsewhere. A sharp rise in district steelmaking operations is providing needed support. However, the mills are still ordering only small tonnages.

● **Cincinnati**—While prices are $2 a ton under those prevailing a month ago, a firmer market appears to be developing. Expectations are prices will move sidewise the next several weeks. Latest brokers' buying prices quote No. 1 cupola at $34-$35, off $2, and machine shop turnings at $9-$10, off $1. Brokers anticipate active June demand in step with rising steelmaking operations.

● **St. Louis**—Not much scrap is moving here. None is being shipped out of the area for export. Prospects are not promising for a pickup in buying until midsummer. One district mill is paying more for material than others, but it is buying only small lots.

● **Birmingham**—Prices have slipped again in this market. No. 1 heavy melting is off $1 to $32-$33, as are machine shop turnings at $18-$19, structurals and plates at $41-$42, electric furnace bundles at $36-$37. Electric furnace material 3 ft and under is off $2 a ton to $34-$35, as is material 2 ft and under at $35-$36.

The market for cast iron is inactive. Stove plate is off $1 a ton at $42-$43.

Loss of strength in the export market is reflected in the lower prices being quoted.

● **Houston**—The market is almost at a standstill here. Major mills are

(*Please turn to Page* 193)

Iron and Steel Scrap

Consumer prices per gross ton, except as otherwise noted, including brokers' commission, as reported to STEEL, May 10, 1961. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

May 10	$36.33
May 3	37.00
Apr. Avg.	38.79
May 1960	33.07
May 1956	50.34

Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	34.00-35.00
No. 2 heavy melting	28.00-29.00
No. 1 dealer bundles	34.00-35.00
No. 2 bundles	25.00-26.00
No. 1 busheling	34.00-35.00
No. 1 factory bundles	41.00-42.00
Machine shop turnings	14.00-15.00
Mixed borings, turnings	14.00-15.00
Short turnings	18.00-19.00
Cast iron borings	17.00-18.00
Cut structurals:	
2 ft and under	39.00-40.00
3 ft and under	38.00-39.00
Heavy turnings	27.00-28.00
Punchings & plate scrap	41.00-42.00
Electric furnace bundles	43.00-44.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	37.00-38.00
Stove plate	37.00-38.00
Unstripped motor blocks	27.00-28.00
Clean auto cast	33.00-34.00
Drop broken machinery	45.00-46.00‡

Railroad Scrap

No. 1 R.R. heavy melt.	37.00-38.00
Rails, 2 ft and under	50.00-51.00
Rails, 18 in. and under	51.00-52.00
Random rails	46.00-47.00
Angles, splice bars	45.00-46.00
Railroad specialties	41.00-42.00
Rails, rerolling	57.00-58.00

Stainless Steel Scrap

18-8 bundles & solids	180.00-185.00
18-8 turnings	105.00-110.00
430 bundles & solids	90.00-95.00
430 turnings	50.00-55.00

CHICAGO

No. 1 hvy melt., indus.	*36.00-37.00*
No. 1 hvy melt., dealer	*34.00-35.00*
No. 2 hvy melting	*29.00-30.00*
No. 1 factory bundles	39.00-40.00
No. 1 dealer bundles	36.00-37.00
No. 2 bundles	22.00-23.00
No. 1 busheling, indus.	*36.00-37.00*
No. 1 busheling, dealer	*34.00-35.00*
Machine shop turnings	15.00-16.00
Mixed borings, turnings	17.00-18.00
Shovel turnings	17.00-18.00
Cast iron borings	17.00-18.00
Cut structurals, 3 ft	39.00-40.00
Punchings & plate scrap	40.00-41.00

Cast Iron Grades

No. 1 cupola	*41.00-42.00*
Stove plate	*36.00-37.00*
Unstripped motor blocks	*33.00-34.00*
Clean auto cast	*46.00-47.00*
Drop broken machinery	*46.00-47.00*

Railroad Scrap

No. 1 R.R. heavy melt.	38.00-39.00
R.R. malleable	46.00-47.00
Rails, 2 ft and under	48.00-49.00
Rails, 18 in. and under	49.00-50.00
Angles, splice bars	41.00-42.00
Axles	57.00-58.00
Rails, rerolling	57.00-58.00

Stainless Steel Scrap

18-8 bundles, solids	180.00-185.00
18-8 turnings	105.00-110.00
430 bundles & solids	90.00-95.00
430 turnings	50.00-55.00

BUFFALO

No. 1 heavy melting	31.00-32.00
No. 2 heavy melting	26.00-27.00
No. 1 bundles	31.00-32.00
No. 2 bundles	24.00-25.00
No. 1 busheling	31.00-32.00
Shovel turnings	17.00-18.00
Machine shop turnings	13.00-14.00
Cast iron borings	15.00-16.00
Low phos. structurals and plates, 2 ft and under	39.00-40.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	38.00-39.00
No. 1 machinery	45.00-46.00

Railroad Scrap

Rails, random lengths	42.00-43.00
Rails, 3 ft and under	48.00-49.00
Rails, rerolling	61.00-62.00
Railroad specialties	41.00-42.00

CLEVELAND

No. 1 heavy melting	33.00-34.00
No. 1 heavy melting	24.00-25.00†
No. 1 factory bundles	38.00-39.00
No. 1 bundles	33.00-34.00
No. 2 bundles	23.00-24.00†
No. 1 busheling	33.00-34.00
Machine shop turnings	12.00-13.00
Shovel turnings	16.00-17.00
Mixed borings, turnings	16.00-17.00
Cast iron borings	16.00-17.00
Cut foundry steel	*30.00-33.00*
Cut structurals, plate, 2 ft and under	38.00-39.00
Low phos, punchings & plate	34.00-35.00
Alloy free, short shovel turnings	18.00-19.00
Electric furnace bundles	35.00-36.00

Cast Iron Grades

No. 1 cupola	39.00-40.00
Charging box cast	26.00-27.00
Heavy breakable cast	28.00-29.00
Stove plate	36.00-37.00
Unstripped motor blocks	31.00-32.00
Brake shoes	37.00-38.00
Clean auto cast	45.00-46.00
Burnt cast	32.00-33.00
Drop broken machinery	46.00-47.00

Railroad Scrap

R.R. malleable	47.00-48.00
Rails, 2 ft and under	47.00-48.00
Rails, random lengths	44.00-45.00
Rails, 18 in. and under	48.00-49.00
Cast steel	39.00-40.00
No 1 railroad cast	48.00-49.00
Railroad specialties	*41.00-42.00*
Angles, splice bars	43.50-44.50
Rails, rerolling	53.00-54.00

Stainless Steel Scrap (Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	155.00-160.00
18-8 turnings	70.00-75.00
430 clips, bundles, solids	70.00-75.00
430 turnings	15.00-25.00

YOUNGSTOWN

No. 1 heavy melting	36.00-37.00
No. 2 heavy melting	25.00-26.00†
No. 1 busheling	36.00-37.00
No. 1 bundles	36.00-37.00
No. 2 bundles	25.00-26.00†
Machine shop turnings	14.00-15.00†
Shovel turnings	19.00-20.00†
Cast iron borings	19.00-20.00†
Low phos.	37.00-38.00
Electric furnace bundles	38.00-39.00

Railroad Scrap

No. 1 R.R. heavy melt.	37.00-38.00

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	30.00-31.00
No. 2 heavy melting	27.50-28.50
No. 1 bundles	31.00-32.00
No. 2 bundles	19.00-20.00
No. 1 busheling	30.00-31.00
Machine shop turnings	*9.00-10.00*
Mixed borings, turnings	11.00-12.10
Shovel turnings	12.00-13.00
Cast iron borings	11.00-12.00
Low phos. 18 in.	38.00-39.00

Cast Iron Grades

No. 1 cupola	*34.00-35.00*
Heavy breakable cast	28.00-29.00
Charging box cast	34.00-35.00
Drop broken machinery	46.00-47.00

Railroad Scrap

No. 1 R.R. heavy melt.	33.00-34.00
Rails, 18 in. and under	46.00-47.00
Rails, random lengths	40.00-41.00

ST. LOUIS (Brokers' buying prices)

No. 1 heavy melting	34.00
No. 2 heavy melting	28.00
No. 1 bundles	34.00
No. 2 bundles	24.00
No. 1 busheling	34.00
Machine shop turnings	13.00
Shovel turnings	16.00

Cast Iron Grades

No. 1 cupola	38.00
Charging box cast	34.00
Heavy breakable cast	32.00
Unstripped motor blocks	34.00
Clean auto cast	38.00
Stove plate	33.00

Railroad Scrap

No. 1 R.R. heavy melt.	*34.00*
Rails, random lengths	37.00
Rails, rerolling	52.00-53.00
Rails, 18 in. and under	43.00
Angles, splice bars	40.00†

PHILADELPHIA

No. 1 heavy melting	*38.00-40.00*
No. 2 heavy melting	*34.00-35.00*
No. 1 bundles	42.00
No. 2 bundles	*24.00*
No. 1 busheling	41.00
Electric furnace bundles	43.00
Mixed borings, turnings	17.00†
Shovel turnings	20.00
Machine shop turnings	*14.00*
Heavy turnings	*25.00†*
Structurals & plates	*43.00-44.00*
Couplers, springs, wheels	*44.00*
Rail crops, 2 ft & under	52.00-54.00

Cast Iron Grades

No. 1 cupola	40.00
Heavy breakable cast	40.00
Drop broken machinery	49.00-50.00†
Malleable	49.00†

NEW YORK (Brokers' buying prices)

No. 1 heavy melting	30.00-31.00
No. 2 heavy melting	23.00-24.00
No. 1 bundles	30.00-31.00
No. 2 bundles	20.00-21.00
Machine shop turnings	5.50-6.00†
Mixed borings, turnings	6.00-6.50†
Shovel turnings	7.00-8.00†
Low phos. structural & plates	32.00-33.00

Cast Iron Grades

No. 1 cupola	34.00-35.00
Unstripped motor blocks	25.00-26.00
Heavy breakable	31.00-32.00

Stainless Steel

18-8 sheets, clips, solids	155.00-160.00
18-8 borings, turnings	70.00-75.00
410 sheets, clips, solids	40.00-45.00
430 sheets, clips, solids	55.00-60.00

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	28.50-29.00
No. 2 heavy melting	25.00-26.00
No. 1 bundles	28.00-29.00
No. 1 busheling	28.50-29.00
Machine shop turnings	5.00-6.00
Shovel turnings	9.00-9.50
No. 1 cast	39.00-40.00
Mixed cupola cast	32.00-33.00
No. 1 machinery cast	40.00-42.00

DETROIT (Brokers' buying prices)

No. 1 heavy melting	27.00-28.00
No. 2 heavy melting	21.00-22.00
No. 1 bundles	30.00-31.00
No. 2 bundles	19.00-20.00
No. 1 busheling	27.00-28.00
Machine shop turnings	8.00-9.00
Mixed borings, turnings	9.00-10.00
Shovel turnings	10.00-11.00

Cast Iron Grades

No. 1 cupola	31.00-32.00
Stove plate	25.00-26.00
Heavy breakable	24.00-25.00
Unstripped motor blocks	22.00-23.00
Charging box cast	26.00-27.00
Clean auto cast	37.00-38.00

Stainless Steel Scrap

18-8 bundles & solids	165.00-170.00
18-8 turnings	65.00-70.00
430 bundles & solids	65.00-70.00
430 turnings	15.00-20.00†

BIRMINGHAM

No. 1 heavy melting	*32.00-33.00*
No. 2 heavy melting	27.00-28.00
No. 1 bundles	32.00-33.00
No. 2 bundles	19.00-20.00
No. 1 busheling	32.00-33.00
Cast iron borings	10.00-11.00
Machine shop turnings	*18.00-19.00*
Shovel turnings	21.00-22.00
Bar crops and plates	42.00-43.00
Structurals & plate	*41.00-42.00*
Electric furnace bundles	*36.00-37.00*
Electric furnace:	
3 ft and under	*34.00-35.00*
2 ft and under	*35.00-36.00*

Cast Iron Grades

No. 1 cupola	42.00-43.00
Stove plate	*42.00-43.00*
Unstripped motor blocks	31.00-32.00
No. 1 wheels	35.00-36.00

Railroad Scrap

No. 1 R.R. heavy melt.	33.00-34.00
Rails, 18 in. and under	44.00-45.00
Rails, random lengths	40.50-41.50
Angles, splice bars	42.00-43.00

HOUSTON

(Brokers' buying prices; f.o.b. car)

No. 1 heavy melting	38.00-39.00†
No. 2 heavy melting	36.00†
No. 1 bundles	37.00-38.00†
No. 2 bundles	25.00-26.00†
Machine shop turnings	12.00-13.00†
Low phos. plate & structurals:	
3 ft	43.00†
2 ft and under	*44.00-45.00†*

Cast Iron Grades

No. 1 cupola	37.00-38.00†
Heavy breakable	26.00-27.00†
Foundry malleable	30.00-31.00†
Unstripped motor blocks	31.00-32.00†

Railroad Scrap

R.R. heavy melt. (3 ft)	43.00†

LOS ANGELES

No. 1 heavy melting	38.00-40.00
No. 1 hvy melt (export)	40.00-45.00
No. 2 heavy melting	34.00-37.00
No. 2 hvy melt (export)	40.00-43.00
No. 1 bundles	30.00-31.00
No. 2 bundles	25.00
No. 2 bundles (export)	27.00-28.00
Machine shop turnings	15.00-17.00
Shovel turnings	15.00-17.00
Cast iron borings	16.00-17.00
Cut structurals and plate 1 ft and under	52.00

Cast Iron Grades

No. 1 cupola	50.00

Railroad Scrap

No. 1 R.R. heavy melt.	42.00

PORTLAND, OREG.

(Prepared, f.o.b. car)

No. 1 heavy melting	44.00-45.00
No. 2 heavy melting	41.00
No. 2 bundles	31.00
Shovel turnings	16.00-18.00
Electric furnace bundles	52.00

Cast Iron Grades

No. 1 cupola	40.00-42.00
Heavy breakable	*37.00*
Unstripped motor blocks	*39.00*
Stove plate (f.o.b. plant)	37.00

SEATTLE (Prepared, f.o.b. car)

No. 1 heavy melting	44.00
No. 1 hvy (unprepared)	*39.00*
No. 2 heavy melting	41.00
No. 2 hvy (unprepared)	*36.00*
No. 2 bundles	31.00
Shovel turnings	16.00
Electric furnace bundles	50.00

Cast Iron Grades

No. 1 cupola	42.00
Heavy breakable cast	39.00
Unstripped motor blocks	39.00-40.00
Stove plate (f.o.b. plant)	37.00

SAN FRANCISCO

No. 1 heavy melting	*41.00***
No. 2 heavy melting	*38.00***
No. 1 bundles	34.00**
No. 2 bundles	27.00**
Machine shop turnings	*18.00***
Mixed borings, turnings	*18.00***
Cast iron borings	*18.00***
Heavy turnings	*18.00***
Shovel turnings	*18.00***
Cut structurals, 3 ft	44.00

Cast Iron Grades

No. 1 cupola	*48.00*
Charging box cast	34.00
Stove plates	34.00
Heavy breakable cast	28.00
Unstripped motor blocks	31.00
Clean auto cast	40.00
Drop broken machinery	45.00-46.00
No. 1 wheels	34.00

HAMILTON, ONT.

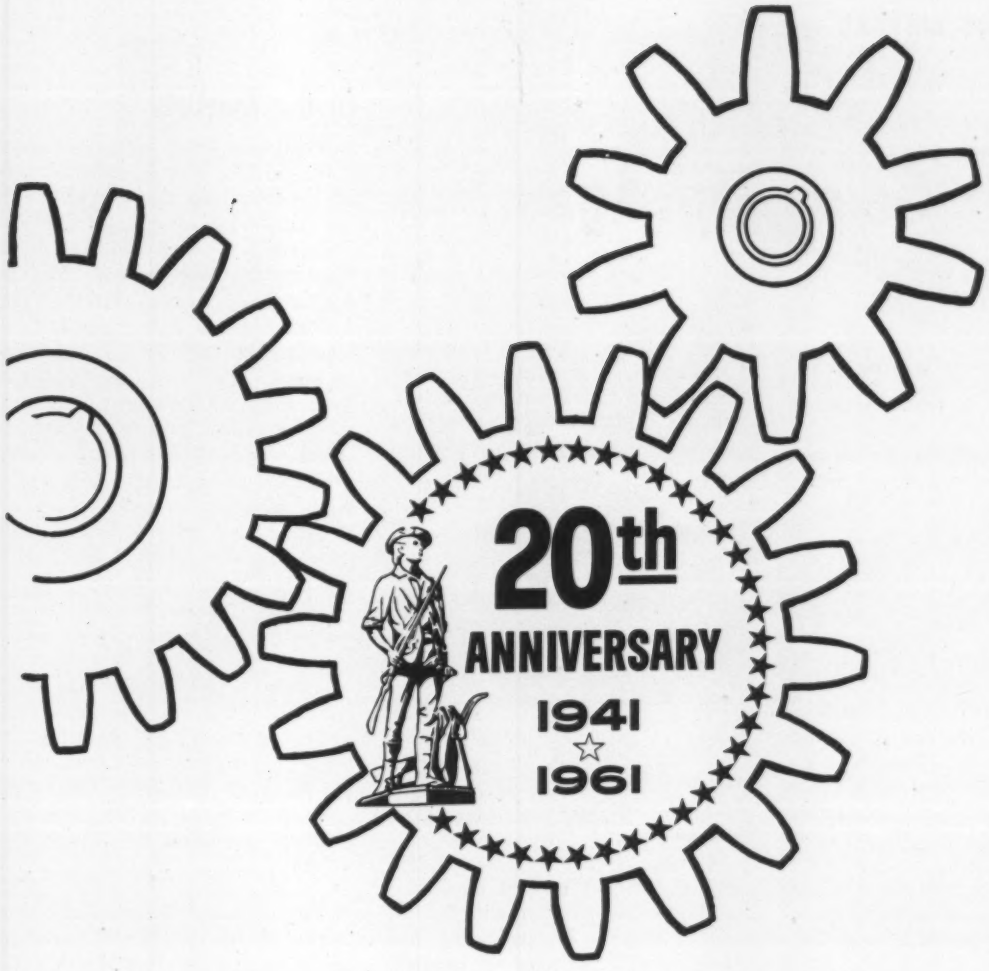
(Brokers' buying prices; net tons)

No. 1 heavy melting	31.00
No. 2 hvy melt, 2 ft & under	29.00
No. 1 bundles	31.00
No. 2 bundles	21.00
Mixed steel scrap	23.00
Mixed borings, turnings	12.00
Busheling, new factory: Prepared	31.00
Unprepared	25.00
Shovel turnings	12.00

Cast Iron Grades‡

No. 1 machinery cast	32.00

*For export add $4 dock charge.
**Based mainly on export sales.
†Nominal.
‡F.o.b. Hamilton, Ont.
§Delivered.



AT THE HEART OF THINGS

This 20th anniversary of the U. S. Savings Bonds program is an important milestone for the 45,000 companies, large and small, which offer the Payroll Savings Plan to their employees. Payroll Savings is the heart of the bond program, and the means by which millions of families have seen dreams realized since 1941. It has been good for business and industry... good for local communities...good for the nation's economic welfare. Above all it is good for the citizen who sees in each Savings Bond a share in his country's future.

If yours is one of the 45,000 participating companies, this anniversary year offers a good reason for renewed promotion. For help and suggestions, contact your State Savings Bonds Director, or write: **U.S. Savings Bonds Division, Treasury Department, Washington 25, D.C.**

U.S. SAVINGS BONDS DIVISION—
20 YEARS OF SERVICE TO AMERICA

STEEL
The Metalworking Weekly

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Copper Going Up Again?

Nonferrous Metal Prices, Pages 192 & 193

THE ANSWER to that question is probably "yes."

The present price is 30 cents a pound. Odds favor an early upward move—probably to 31 cents. Here's why: The factors that triggered the May 2 hike (tight and expensive scrap, a high foreign price, good business here and abroad) are still present.

Custom smelters who initiated the last hike, aren't even in the market as sellers. Scrap prices have been rising steadily ever since. As one metalman puts it: "They've never been higher." When scrap prices are at that level, it's not economical for custom smelters to sell.

The London Metal Exchange is at the equivalent of 30 cents a pound plus. Copper on the commodity exchange is being quoted at more than 31 cents.

Those factors add up to an increase in copper prices. Look for custom smelters to initiate it, then for the primary producers to follow. It's doubtful if any copper company will resist a higher price. First quarter earnings were too low for that.

Upturn for Aluminum

Confidence is growing that this will be a better year for aluminum than earlier forecasts indicated. The National Association of Aluminum Distributors polled its membership and came up with this sales forecast for 1961 (vs. 1960): Sheets, plates, and coil, up 11 per cent; extrusions and pipe, up 8 per cent; wire, rods, bars, and structurals, up 6 per cent; and tubing, up 1 per cent.

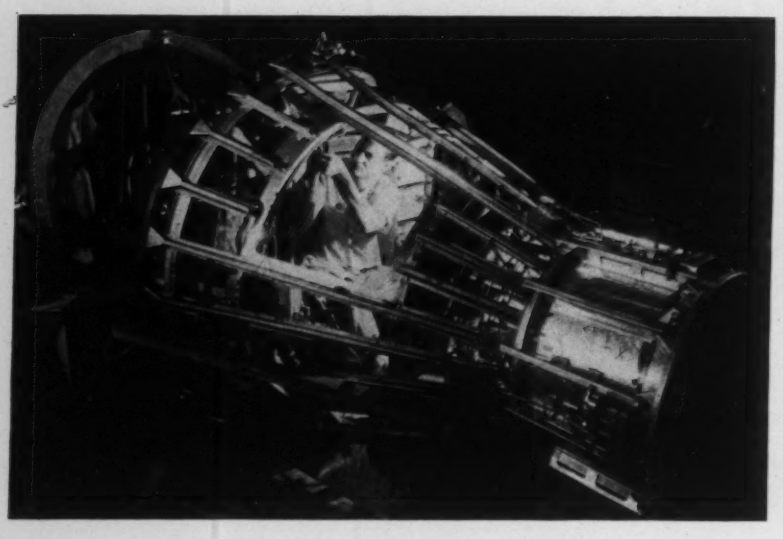
Another symptom: Anaconda Aluminum Co. has boosted operations to 100 per cent of capacity (65,000 tons a year). The company had been at 87.5 per cent of capacity since July, 1959. Kaiser Aluminum & Chemical Co. has restarted several idle potlines.

In the Markets

• **Tellurium Price Upped**—A new price ($5.25 a pound) is being quoted for tellurium, the material with the highest known capacity for heat and electrical generation. The $1.25 increase was spurred by steadily rising applications in thermoelectric heating, cooling, and power generation devices. Look for 1961 sales to top 400,000 lb vs. 317,000 lb last year. All indications are the thermoelectrics market will really begin to boom shortly. One hint: A hotel chain and a leading appliance maker have signed a contract to install thermoelectric refrigerators in each room of a new Chicago hotel.

• **Higher Purities Wanted**—Rising demand for nine high purity metals —antimony, arsenic, bismuth, cadmium, gold, indium, selenium, silver, and tellurium — has encouraged American Smelting & Refining Co. to put production on a commercial scale. That will make the metals (of more than 99.999 per cent purity) available as off-the-shelf items.

• **Zinc Demand Better**—April shipments of slab zinc (76,699 tons) hit the highest mark since March, 1960. All the gain came from increased demand for prime Western metal from galvanizers.



Where the Spaceman Rode

The Mercury space capsule (left) in which our astronaut rode is basically a titanium structure. The pressurized capsule is a sandwich of two titanium sheets welded to a truncated conical rib structure made of titanium. A lot of the metal was also used in the antenna and parachute housing and the adapter section mating it to the booster, reports the supplier, Titanium Metals Corp. of America.

Like the Mercury space shot, the titanium industry has been soaring. A near failure two years ago, the industry bounced back in 1960 to score its second highest sales. This could easily be its best year.

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Only T-J's complete line can assure you a cylinder of either air or hydraulic application – with practically limitless design specifications for bore, stroke, pressure range and even delivery requirement. From the time-tested, standard tie-rod air and hydraulic, to the exclusive T-J Spacemaker, and including the recently introduced Squair Head, T-J cylinders give you more features for efficient, long-lasting operation. Write today!

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THE ONLY COMPLETE ENGINEERING CATALOG LINE, TOO!

H-47 for standard tie-rod hydraulic cylinders.

SQ-1058-4 for the T-J Squair Head cylinder.

No. 54 for standard tie-rod air cylinders.

SM-56-3 for the incomparable Spacemaker cylinder.

HSM5-58-4 for the High-Pressure Hydraulic Spacemaker cylinder.

THE TOMKINS • JOHNSON CO. JACKSON, MICH.

CYLINDERS • MILLING CUTTERS • RIVETERS and CLINCHERS

Nonferrous Metals

Cents per pound, carlots except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99.5%, 50 lb ingots, 26.00, 30,000 lb or more, f.o.b. customer custody.

Aluminum Alloy: No. 13, 25.90; No. 43, 26.20; No. 195, 27.60; No. 214, 29.00; No. 356, 26.80, 50 lb ingots.

Antimony: R.M.M. brand, 95.5%, 32.50; Lone Star brand, 33.00, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 30.50-31.00, New York, duty paid, 10,000 lb or more.

Beryllium: 97% lump or beads, $70.00 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $65 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.

Beryllium Copper: 3.75-4.75% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. shipping point.

Bismuth: $2.25 per lb, ton lots.

Cadmium: Sticks and bars, $1.70 per lb deld.

Cobalt: 99+%, $1.50 per lb for 500-lb keg; $1.52 per lb for 100 lb case; $1.57 per lb under 100 lb.

Columbium: Powder, $55 per lb and up nom.

Copper: Electrolytic, 30.00 deld.; custom smelters, 30.00; lake, 30.00 deld.; fire refined, 29.75 deld.

Germanium: First reduction, ingots, less than 1 kg. 36.00-37.50 per gram; 1-10 kg. 30.50-32.00 per gram; 10 kg or more, 28.10-29.99 per gram; intrinsic grade, under 10 kg, 31.95 per gram; 10 kg or more, 29.95 per gram.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $70-75 per troy oz nom.

Lead: Common, 10.80; chemical, 10.90; corroding, 10.90; St. Louis, New York basis, add 0.20.

Lithium: 1 lb or 2 lb ingots, less than 24 lb, $11 per lb deld.; 24-90 lb, $9.50; 100-499 lb, $9.25; 450 lb or more, $9 per lb, delivered.

Magnesium: Pig, 35.25; ingot, 36.00 f.o.b. Velasco, Tex., 1.3 in. diam. x 12 in. sticks, 57.00 f.o.b. Madison, Ill.

Magnesium Alloy: AZ91A (diecasting), 40.75; AZ63A, AZ92A, AZ91C (sand casting), 40.75 f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $203-205 per 76 lb flask.

Molybdenum: Unalloyed forging billets, 4.125-8.5 in. diam., 50-4999 lb, $8.15 per lb, depending on quantity; 5000 lb or more, $8 per lb. f.o.b. Coldwater, Mich.

Nickel: Electrolytic cathodes, briquettes, sheets (4 x 4 in. and larger), unpacked, 74.00; 10-lb pigs, unpacked, 78.25; "XX" nickel shot, 79.50; "F" nickel shot for addition to cast iron, in kegs, 74.50; "F" nickel, 5 lb ingots, 75.50. Prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.01; Exton, Pa., basis, add 1.60. Nickel oxide sinter at Buffalo, New York, or other established U. S. ports of entry, contained nickel 69.60.

Osmium: $70-90 per troy oz nom.

Palladium: $24-26 per troy oz.

Platinum: $82-85 per troy oz from refineries.

Radium: $16-21.50 per mg radium content, depending on quantity.

Rhodium: $137-140 per troy oz.

Ruthenium: $55-60 per troy oz.

Selenium: $6.50-7 per lb, commercial grade.

Silver: Open market, 91.375 per troy oz.

Sodium: Solid pack, c.l., 19.50; l.c.l., 20.00; 5 and 12 lb bricks, c.l., 21.00; l.c.l., 21.50; tank car, 17.00.

Tantalum: Melting stock, $35 per lb; rod, $60 per lb nom; sheet, $55 per lb nom.

Tellurium: $5.25 per lb, 100 lb or more.

Thallium: $7.50 per lb.

Tin: Straits, N. Y., spot and prompt, 110.25.

Titanium: Sponge, 99.3+% grade A-1, ductile (0.3% Fe max.), $1.60 per lb; grade A-2 0.5% Fe max), $1.50 per lb.

Tungsten: Powder, 98.8%, carbon reduced, 100-lb lots, $2.90 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00c; 99+% hydrogen reduced, $3.10-4.00.

Zinc: Prime western, 11.50; brass special 11.75; intermediate, 12.00, East St. Louis, freight allowed over 0.50 per lb. New York basis, add 0.50. High grade, 12.85; special high grade, 13.00 deld. Die casting alloy ingot No. 3, 14.25; No. 2, 14.75; No. 5, 14.50 deld.

Zirconium: Reactor grade sponge, 100 lb or less, $8-8.50 per lb; 100-500 lb, $7.25-7.50 per lb; 500-1000 lb, $6.50-7.25; over 1000 lb, $6.50 per lb.

(Note: Chromium, manganese, and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 24.25-26.00; No. 12 foundry alloy (No. 2 grade), 21.75-22.25; 5% silicon alloy, 0.60 Cu max, 23.50-24.00; 13 alloy, 0.60 Cu max., 23.50-24.00; 195 alloy, 24.75-25.75; 108 alloy, 22.25-22.75. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 23.25; grade 2, 22.00; grade 3, 21.00; grade 4, 20.00.

Brass Ingot: Red brass, No. 115, 31.00; tin bronze, No. 225, 40.50; No. 245, 35.00; high leaded tin bronze, No. 305, 35.25; No. 1 yellow, No. 405, 30.50; manganese bronze No. 421, 29.75.

Magnesium Alloy Ingot: AZ63A, 37.50; AZ91B, 37.25; AZ91C, 41.25; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nom. 1.9% Be alloy.) Strip, $1.945, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.945, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 20,000-lb lots, 35.35; l.c.l., 35.98. Weatherproof, 20,000-lb lots, 36.30; l.c.l., 37.05.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $16.50 per cwt; pipe, full coils, $16.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill.) Sheet and strip, $6.75-15.50; sheared mill plate, $5.25-9.00; wire, $5.55-9.50; forging billets, $3.20-4.75; hot-rolled and forged bars, $3.80-6.25.

ZINC

(Prices per lb, c.l., f.o.b. mill.) Sheets, 28.00; ribbon zinc in coils, 22.50; plates, 21.50.

ZIRCONIUM

Plate, $14.00-25.00; H.R. strip, $14.00-22.90; C.R. strip, $16.00-35.00; forged or H.R. bars, $11.00-17.40.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	138	120	138
Strip, C.R.	124	108	138
Plate, H.R.	130	110	126
Rod, Shapes, H.R.	107	89	109
Seamless Tubes	157	129	200

ALUMINUM

(Selected products and sizes)

Flat Sheets: 1100, 3003, and 5005, mill finish, 30,000 lb base f.o.b. customer custody.

Thickness Range (in.)	Width (in.)	Length Range (in.)	Price Range
0.250-0.136	24-72	72-180	45.40-48.00
0.136-0.096	24-72	72-180	45.90-48.80
0.096-0.077	24-72	72-180	46.40-50.30
0.077-0.068	24-72	72-180	46.90-52.10
0.068-0.061	24-72	72-180	46.90-55.00
0.061-0.048	24-72	72-180	47.40-57.70
0.048-0.038	24-72	72-180	47.90-60.50
0.038-0.030	24-72	72-180	48.40-65.30
0.030-0.024	24-72	72-180	48.90-67.20
0.024-0.019	24-60	72-180	49.40-59.90
0.019-0.017	24-48	72-144	50.30-57.00
0.017-0.015	24-48	72-144	51.20-58.00
0.015-0.014	24-36	72-144	52.30
0.014-0.012	24-36	72-144	53.50
0.012-0.011	24-36	72-114	54.60
0.011-0.0095	24-46	72-144	56.20
0.0095-0.0085	24-36	72-96	57.50
0.0085-0.0075	24-36	72-96	59.20
0.0075-0.007	24-36	72-96	60.80
0.007-0.006	24-36	72-96	62.50

ALUMINUM (continued)

Plates and Circles: Thickness, 0.25-3 in.; width or diam., 24-60 in.; length, 72-240 in., mill finish.

Alloy	Plate Base	Circle Base
1100, 3003-F	44.60	50.90
5050-F	45.70	50.50
3004-F	46.70	52.40
5052-F	47.30	53.10
6061-T6	47.80	53.90
2024-T4*	51.80	58.90
7075-T6*	60.50	67.90

*24-48 in. width or diam., 72-180 in. lengths.

Screw Machine Stock: 30,000 base, 12 ft lengths.

Diam	Round		Hexagonal	
(in.)*	2011-T3	2017-T4	2011-T3	2017-T4
0.125	74.90	77.30	....	....
0.188	63.20	63.20	....	80.10
0.250	60.00	62.60	72.70	74.10
0.375	59.20	63.80	71.00	72.00
	2011-T3	2017-T451	2011-T3	2017-T451
0.500	59.20	63.80	71.00	72.00
0.625	59.20	63.80	67.80	67.90
0.750	57.70	62.00	61.60	63.80
0.875	57.70	62.00	61.60	63.80
1.000	57.70	62.00	61.60	63.80
1.125	55.30	59.50	59.50	61.50
1.250	55.30	59.50	59.50	61.50
1.375	55.30	59.50	59.50	61.50
1.500	55.30	59.50	59.50	61.50
1.625	53.00	56.70	....	59.30
1.750	53.00	56.70	58.30	59.30
1.875	53.00	56.70	....	59.30
2.000	53.00	56.70	58.30	59.30
2.250	51.50	55.00	....	59.30
2.500	51.50	55.00	....	59.30
2.750	49.90	53.20	....	59.30
3.000	49.00	53.20	....	59.30
3.250	....	53.20	....	....
3.375	....	53.20	....	....

*Selected sizes.

Forging Stock: Round, Class 1, random length, diam., 0.375-8 in., "F" temper; 2014, 47.50-57.60; 6061, 43.50-57.60; 7075, 61.80-71.90; 7079, 66.80-76.90.

Pipe: ASA schedule 40, alloy 6063-T6, 3-40 ft lengths, plain ends, 90,000 lb base, dollars per ft. Nominal pipe sizes: 1 in., 32.00; 1¼ in., 43.40; 1½ in., 51.80; 2 in., 62.60; 3 in., 124.95; 4 in., 171.80; 5 in., 233.15; 6 in., 308.55; 8 in., 464.35; 10 in., 716.25 (3-24 ft lengths).

Factor	Alloy 6063-T5	Alloy 6062-T6
1-14	45.30-46.80	54.00-60.00
15-17	45.30-46.80	56.50-61.80
18-23	45.80-47.50	58.60-67.60
24-32	45.80-47.50	66.80-81.50
33-38	49.50-52.20	85.10-96.60
39-44	59.80-63.60	102.00-124.00

MAGNESIUM

Sheets and Plates: AZ31B standard grades, .032 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.00 in., 67.90. AZ31B spec. grades, .032 in., 171.30; .081 in., 108.80; .125 in., 98.10; .188 in., 95.70; .250-2.00 in., 93.30. Tread plate, 60-192 in. lengths, 24-72 in. widths; .125 in., 74.90; .188 in., 71.70-72.70; .25-.75 in., 70.60-71.60. Tooling plate, 0.25-3.00 in., 73.00.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grades (AZ31B)
6-8	65.30-67.60	84.60-87.40
12-14	65.30-67.60	85.70-88.00
24-26	66.10-68.40	90.60-91.30
36-38	71.50-75.30	104.20-105.30

NONFERROUS SCRAP

DEALERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 23.25-23.75; No. 2 heavy copper and wire, 22.00-22.50; light copper, 19.50-20.00; No. 1 composition red brass, 20.75-21.25; No. 1

BRASS MILL PRICES

	MILL PRODUCTS a				SCRAP ALLOWANCES d (Based on copper at 30.00c)		
	Sheet, Strip, Plate	Rod	Wire	Seamless Tubes	Clean Heavy	Rod Ends	Clean Turnings
Copper	55.13b	50.36-52.36	....	56.32	26.00	26.00	25.25
Yellow Brass	48.77	34.33c	49.06	52.93	19.875	19.00c	18.00c
Low Brass, 80%	51.45	51.39	51.74	55.51	22.25	22.00	21.50
Red Brass, 85%	52.39	52.33	52.68	56.45	23.00	22.75	22.25
Com. Bronze, 90%	53.88	53.82	54.17	57.69	23.875	23.625	23.125
Manganese Bronze	57.27	50.85	61.12	....	18.750	18.50	17.875
Muntz Metal	51.54	46.85	....	....	18.75	18.50	18.00
Naval Brass	53.51	47.32	59.82	57.67	18.625	18.375	17.875
Silicon Bronze	60.43	59.62	59.72	78.84	25.50	25.25	24.50
Nickel Silver, 10%	64.31	66.64	66.39	....	24.75	24.50	12.375
Phos. Bronze, A-5%	75.87	76.37	75.62	77.80	27.375	27.125	26.125

a. Cents per lb, f.o.b. mill; freight allowed on 50 lb or more. b. Hot-rolled. c. Free cutting. d. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time of any or all kinds of scrap, add 1 cent per lb.

composition turnings, 19.75-20.25; new brass clippings, 17.25-17.75; light brass, 14.25-14.75; heavy yellow brass, 15.25-15.75; new brass rod ends, 16.25-16.75; auto radiators, unsweated, 15.50-16.00; cocks and faucets, 17.25-17.75; brass pipe, 17.75-18.25.

Lead: Soft scrap lead, 7.25-7.75; battery plates, 3.00-3.25; linotype and stereotype, 8.50-8.75; electrotype, 8.00-8.25; mixed babbitt, 9.50-10.00.

Monel: Clippings, 23.00-23.50; old sheets, 22.00-23.00; turnings, 16.50-17.00; rods, 22.00-23.00.

Nickel: Sheets and clips, 52.00-54.00; rolled anodes, 52.00-54.00; turnings, 40.00; rod ends, 52.00-54.00.

Zinc: Old zinc, 3.50-4.00; new diecast scrap, 3.50-4.00; old diecast scrap, 1.75-2.00.

Aluminum: Old castings and sheets, 9.75-10.25; clean borings and turnings, 4.50-5.00; segregated low copper clips, 11.75-12.25; segregated high copper clips, 10.75-11.25; mixed low copper clips, 11.25-11.75; mixed high copper clips, 10.75-11.25.

(Cents per pound, Chicago)

Aluminum: Old castings and sheets, 9.75-10.25; clean borings and turnings, 7.00-7.50; segregated low copper clips, 15.00-15.50; segregated high copper clips, 13.00-13.50; mixed low copper clips, 12.50-13.00; mixed high copper clips, 12.00-12.50.

(Cents per pound, Cleveland)

Aluminum: Old castings and sheets, 11.00; clean borings and turnings, 9.00-9.50; segregated low copper clips, 14.00; segregated high copper clips, 13.50; mixed low copper clips, 13.50; mixed high copper clips, 13.00-13.50.

REFINER'S BUYING PRICES

(Cents per pound, carlots, delivered refinery)
Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 56.00; light scrap, 51.00; turnings and borings, 36.00.

Copper and Brass: No. 1 heavy copper and wire, 28.50; No. 2 heavy copper and wire, 26.50; light copper, 24.25; refinery brass (60% copper) dry copper content, 25.00-25.25.

INGOTMAKERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 28.50; No. 2 heavy copper and wire, 26.50; light copper, 24.25; No. 1 composition borings, 23.00; No. 1 composition solids, 23.50; heavy yellow brass solids, 18.00; yellow brass turnings, 17.00; radiators, 18.50.

Plating Material

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.60.

Copper: Flat-rolled, 47.04; oval, 43.50; electrodeposited, 39.00; cast, 41.50; 5000-10,000 lb quantities.

Nickel: Depolarized, less than 500 lb, 109.00; 500-1999 lb, 102.00; 2000-4999 lb, 98.50; 5000-29,999 lb, 97.50; 30,000 lb, 96.50. Carbonized, deduct 3 cents a lb.

Tin: Bar or slab, less than 200 lb, 128.50; 200-499 lb, 127.00; 500-999 lb, 126.50; 1000 lb or more, 126.00.

Zinc: Balls, 18.75; flat tops, 18.75; flats 21.50; ovals, 20.75, ton lots.

CHEMICALS

Cadmium Oxide: $1.60 per lb in 100-lb drums.

Chromic Acid (flake): 100-2000 lb, 31.00; 2000-10,000 lb, 30.50; 10,000-20,000 lb, 30.00; 20,000 lb or more, 29.50.

Copper Cyanide: 100-200 lb, 65.90; 300-900 lb, 63.00; 1000-19,000 lb, 61.90.

Copper Sulphate: 100-1900 lb, 15.00; 2000-5900 lb, 13.00; 6000-11,900 lb, 12.75; 12,000-22,900 lb, 12.50; 23,000 lb or more, 12.00.

Nickel-Chloride: 100 lb, 45.00; 200 lb, 43.00; 300 lb, 42.00; 400-4900 lb, 40.00; 500-9900 lb, 38.00; 10,000 lb or more, 37.00.

Nickel Sulphate: 5000-22,999 lb, 29.00; 23,000-39,900 lb, 28.50; 40,000 lb or more, 28.00.

Sodium Cyanide (Cyanobrik): 2000 lb, 23.80; 400-900 lb, 20.80; 1000-4900 lb, 19.80; 5000-19,900 lb, 18.80; 20,000 lb or more, 17.60.

Sodium Stannate: Less than 100 lb, 83.80; 100-600 lb, 74.10; 700-1900 lb, 71.40; 2000-9900 lb, 69.50; 10,000 lb or more, 68.20.

Stannous Chloride (Anhydrous): 25 lb, 159.90; 100 lb, 155.00; 400 lb, 152.60; 800-19,900 lb, 111.70; 20,000 lb or more, 105.60.

Stannous Sulphate: Less than 50 lb, 144.80; 50 lb, 114.80; 100-1900 lb, 112.80; 2000 lb or more, 110.80.

Zinc Cyanide: 100-200 lb, 59.00; 300-900 lb, 57.00.

(*Concluded from Page 187*)

still drawing on their inventories built up recently. Since there has been so little activity the last two weeks, prices are nominal, and a decline is thought certain in another week when the mills are expected to resume buying. Some dealers think prices will drop at least $3 a ton.

• **San Francisco**—Prices eased off last week, but not as much as had been expected. The top grades of open hearth material were knocked down $1 a ton as pressure for export shipments relaxed.

• **Portland, Oreg.**—No. 1 and No. 2 heavy melting steel are unchanged at recently established levels, but No. 1 cupola cast is firmer at $42, and motor blocks are up $2 to $39. The market is fairly active. Receipts are large, and sales are moving a substantial tonnage. Exports continue to exert a strengthening influence. Two full cargoes are being shipped to Japan this month.

• **Seattle**—The market is steady, and prices are firm. Dealers report a spread of $5 between No. 1 and No. 2 heavy melting grades. The export section of the market is busy, with full cargoes and parcel shipments to Japan continuing.

Distributors . . .

Prices, Page 182

Service center operators report a pickup in demand. Automotive, appliance, machine tool, railroad, and other industries are buying more actively. Most customers want quick delivery.

April shipments of a Pittsburgh firm specializing in structurals were the largest of the year to date—but not quite 5 per cent higher than those in March. Most distributors expect this month's shipments to show a gain. Those specializing in flat rolled steel have seen a strong seasonal upswing in galvanized products.

The situation in foreign steel is mixed. A major Houston distributor says foreign prices are up $1 a ton on deformed reinforcing bars, rounds, squares, flats, channels, and I-beams. But in Seattle, Japanese plates and bars are being offered at

CLASSIFIED

MODERN PLANTS—WANTED

Facilities for fabricating structural steel (1500 tons mo.) Welded Steel Pipe, plate shop.

Shipbuilding facilities barge yard.

Furnish blueprint of layout, buildings, list machinery all equipment.

Plants preferably located in South must be located near steel mills.

State banking connections asking price required. All replies treated in strictest confidence.

Reply Box 933, STEEL
Penton Bldg. Cleveland 13, Ohio

MOTORS • GENERATORS • TRANSFORMERS
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Machinery and Equipment Wanted

WANTED

Machinery for Structural Steel and Plate Shop:

Shears	Punches
Plate Rolls	Presses
Flanging Machine	Drills

Furnish full details, price. Replies confidential. Box 932, STEEL, Penton Bldg., Cleveland 13, Ohio.

For Sale

FOR SALE

Coil handling ram truck 20,000# capacity, automatic electric, 6' lift, used, in excellent condition. Factory Price — $40,000.00 — Our Price $9200.00.

Mobile Industrial Equipment Corp.
9th & Tioga Streets Philadelphia 40, Pa.
BAldwin 6-1200

Positions Wanted

MANUFACTURING & PLANT ENGINEER—Capable of Dept. Management responsible for the functions covering Methods, Cost Analysis, Estimating, Tool and Machine Design, Time Study, Plant Layout, Maintenance, Powerplant and Buildings. Heavy experience in following processes: Assembly, Machining, Resistance Welding, Brazing, Material Handling, Automatic Buffing and Polishing, Presswork, etc. Creative and Analytical approach to cost reduction programs. Presently employed with large Automotive Mfg. Corp. Have been with same company for past 11 years. Salary range $9,000. Resume on request. Reply Box No. 934, STEEL, Penton Bldg., Cleveland 13, Ohio.

CLASSIFIED RATES

All classifications other than "Position Wanted" set solid, 50 words or less $20.00, each additional word, .40; all capitals, 50 words or less $23.00, each additional word .50; all capitals leaded, 50 words or less $28.00, each additional word .65. "Position Wanted" set solid, 25 words or less $5.50, each additional word .22; all capitals 25 words or less $7.50, each additional word .29; all capitals leaded 25 words or less $9.00, each additional word .35. Keyed address takes seven words. Cash with order necessary on "Position Wanted" advertisements. Replies forwarded without charge. Displayed classified rates on request. Address your copy and instructions to STEEL, Penton Building, Cleveland 13, Ohio.

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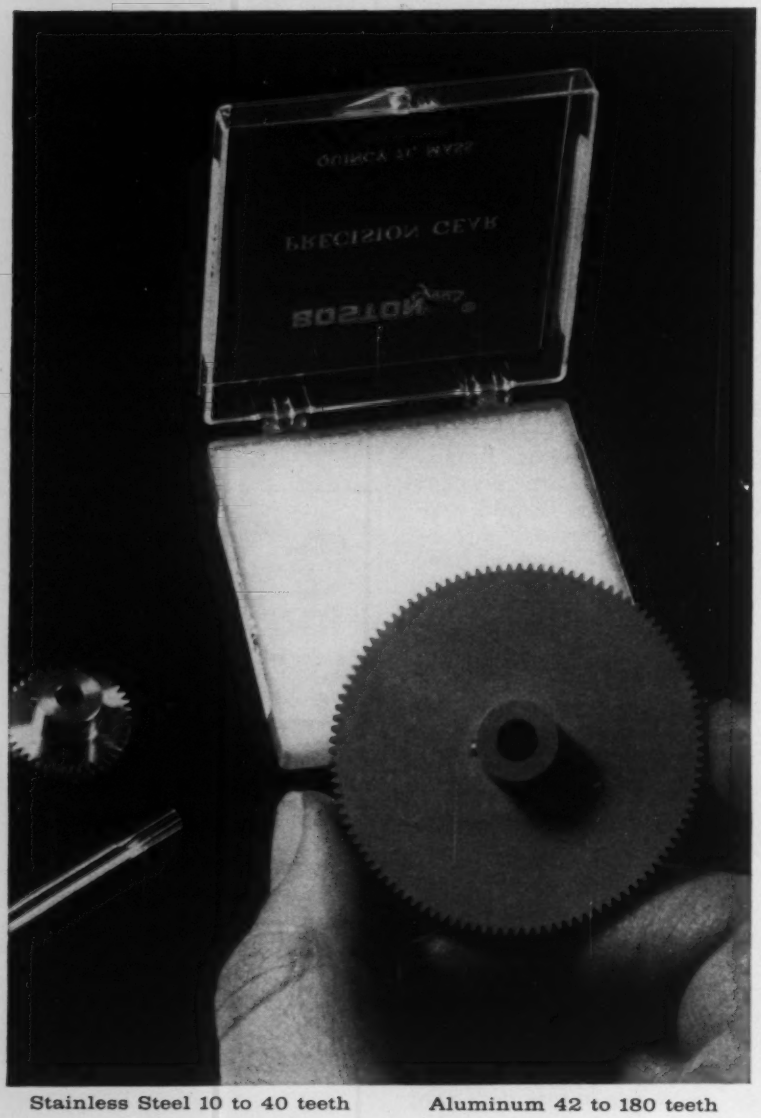

Stainless Steel 10 to 40 teeth Aluminum 42 to 180 teeth

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120 to 48 pitch – 20° P.A. Get new Catalog PG160
Conform to Military specifications
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Quincy 71, Mass.

discount prices. One recent shipment totaled 1000 tons.

Pig Iron . . .

Pig Iron Prices, Page 182

Demand for pig iron and hot metal for steel mill consumption is rising sharply in some districts; in others, there is no marked acceleration. Merchant iron market remains quiet.

Producers are reactivating many blast furnaces. E. J. Lavino & Co. will resume production of ferromanganese late this month at its Sheridan, Pa., blast furnace which has been out of operation since last July.

Republic Steel Corp., relighted No. 3 blast furnace at its Cleveland district plant, reflecting an increase in demand for merchant pig iron from foundry customers. The move follows by two weeks the relighting of the plant's No. 6 blast furnace. Republic has four of six Cleveland blast furnaces in production.

Youngstown Sheet & Tube Co. blew in an additional blast furnace May 4 at its Campbell (Ohio) Works, making five of seven units operative.

U. S. Steel Corp. relighted another blast furnace at Gary, Ind., making seven out of 12 operative.

Iron ore . . .

Iron Ore Prices, Page 183

Reflecting the slow start of the 1961 navigation season on the Great Lakes, shipments of Lake Superior iron ore in April (U. S. and Canada) totaled only 213,482 gross tons, down 5,434,378 tons from the 5,647,860 tons moved in the same month of 1960, reports the American Iron Ore Association.

Shipments to May 1 this year of 213,482 tons compare with 5,675,931 tons to the same date last year.

Imports of iron ore in February totaled 1,661,708 gross tons valued at $15,775,318. Imports in the first two months this year totaled 3,295,518 tons valued at $31,367,648.

Iron Ore Imports—February, 1961

(Gross tons)

Source	February	January-February
Brazil	72,920	184,196
Canada	26,678	56,973
Chile	95,314	319,310
Liberia	44,290	118,689
Mexico	.....	107
Peru	68,750	185,514
United Kingdom	27	27
Venezuela	1,353,729	2,430,702
Totals	1,661,708	3,295,518

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May 22

In

STEEL

The Pressure from Government

The tenth of 25 installments during 1961 on Profit Growth shows that one part of the profit squeeze problem is the steadily increasing pressure from government actions and regulations. next week, STEEL will show some of the ways that pressure can be relieved.

For a free copy of any or all articles in this series, appearing biweekly since Jan. 16, write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.

Can you understand this man's hunger for Tools?

Without them he's useless—a burden to himself and the earth. ■ With tools in his hands—a spade, a hoe, a trowel, a rake—he could raise food enough for his own family and perhaps other hungry villagers. ■ But for this man and countless others like him in Greece, in India, in Latin America and other desperately poor areas—the simplest steel implements are beyond reach. They cost too much. So millions of acres are barely scratched...with forked sticks or wooden ploughs...and two-thirds of the world's people still go to sleep hungry. ■ Will you help them till the fertile earth...through CARE? Wherever possible, CARE food distribution is coupled with a tools-for training program that enables men and women to become self-supporting. The need was never greater, the rewards never richer. ■ *Will you buy an extra tool*—to put into hands hungry for work, food, and dignity? ■ Send dollars to CARE, New York 16.

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Here is $_____ for food ☐ tools ☐
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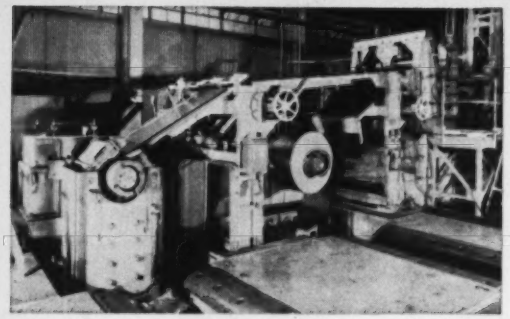
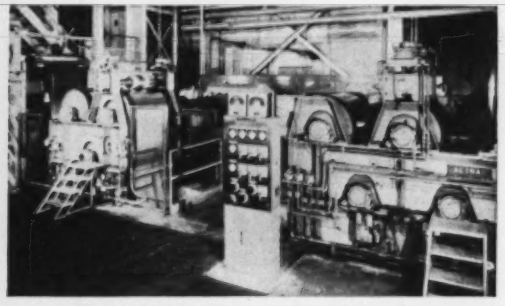
(Space donated by this publication)

Continuous Annealing and Surface Treatment Lines have a lot in common



Delivery end shows recoiling.

Entry Section with uncoiling and scrap handling.



Multiple Bridle Rolls help maintain constant tension.

Strip Cleaning (horizontal) includes scrubbers and cleaning tanks.

BLAW-KNOX

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300 Sixth Avenue, Pittsburgh 22, Pennsylvania

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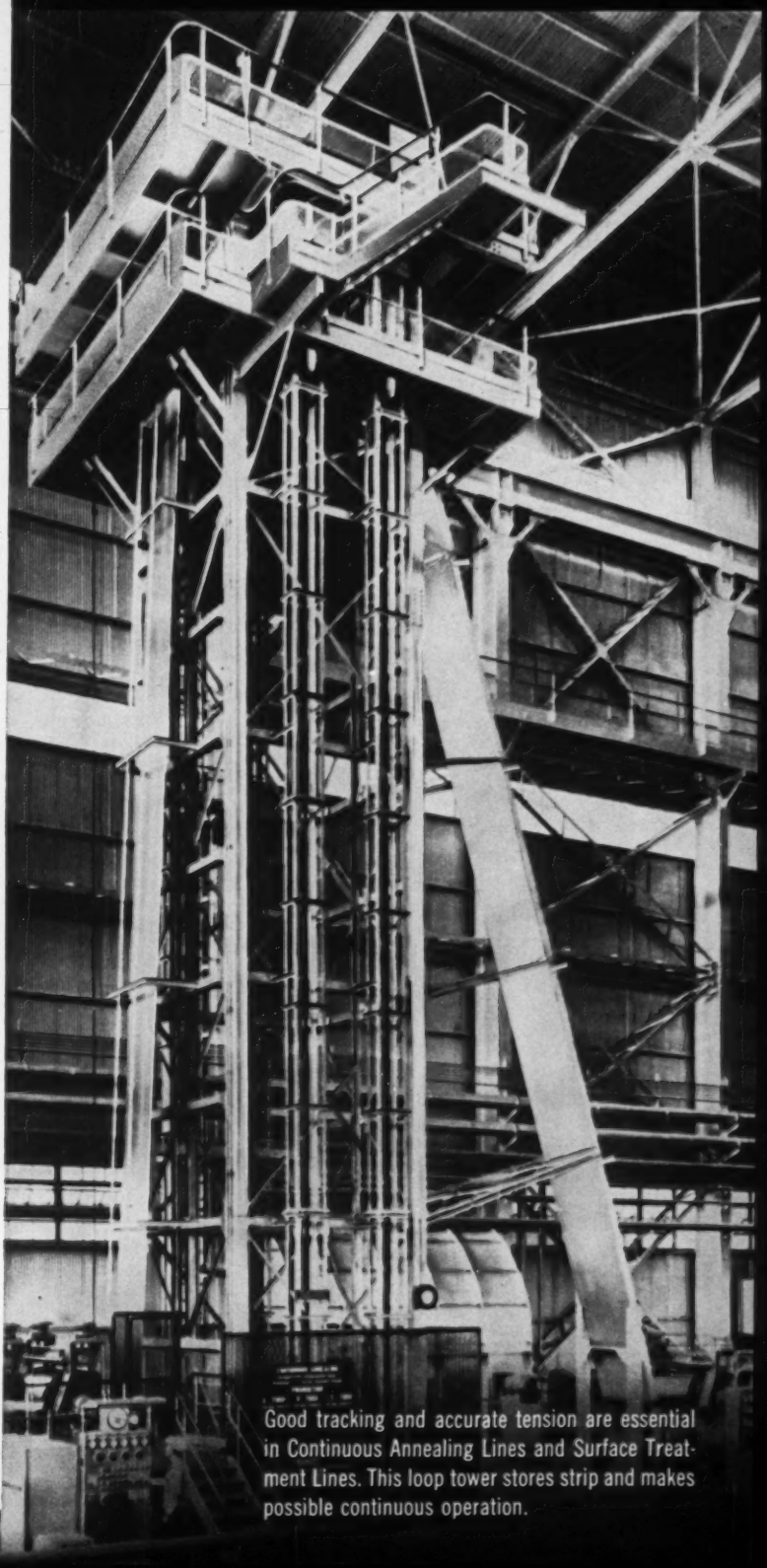
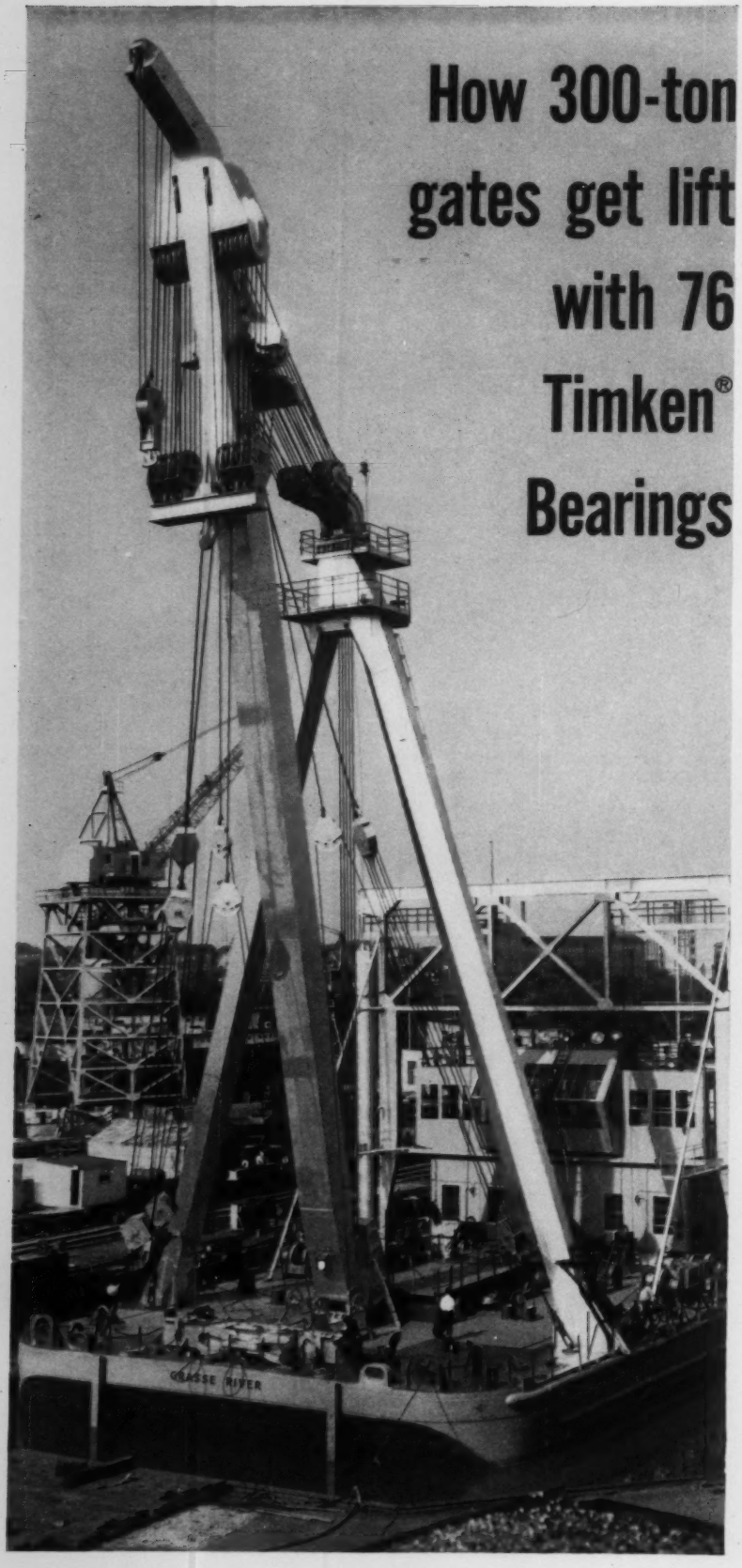


Good tracking and accurate tension are essential in Continuous Annealing Lines and Surface Treatment Lines. This loop tower stores strip and makes possible continuous operation.



How 300-ton gates get lift with 76 Timken® Bearings

Here's a lift job to make your eyes pop. This gate lifter barge hoists the St. Lawrence Seaway's 300-ton lock gates for maintenance work. Stress is great on the 72 hoisting sheaves. To take it, McKissick Products Co. of Tulsa, Okla., the sheave builders, mounted them on Timken® tapered roller bearings. Sheaves were installed by the American Ship Building Co. of Cleveland, O. And a Timken bearing is used in the main hook thrust position to support the entire 300-ton load. Timken bearings are also used in the derrick head-Rooster.

The tapered design of Timken bearings lets them take all the loads, *both* radial *and* thrust. Maximum sheave rigidity and accurate sheave alignment are provided by the TDO type sheave bearings with their built-in, large, effective bearing spread distances. And because of Timken bearings' true rolling motion, sheaves turn easily, dependably, even under heavy overloads.

SERVICE THAT SAVES YOU TIME AND MONEY. Our graduate engineer salesmen can solve your bearing problems on the spot—right at the design stage.

The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO." Makers of Tapered Roller Bearings, Fine Alloy Steel and Removable Rock Bits. Canadian Division: Canadian Timken, St. Thomas, Ont.

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